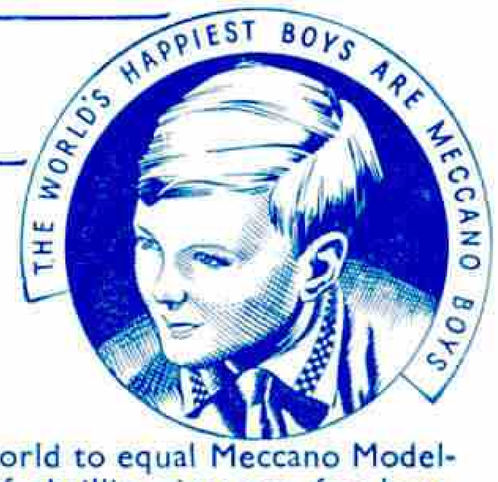
VOL. XXI. Nº 11. NOVEMBER 1936

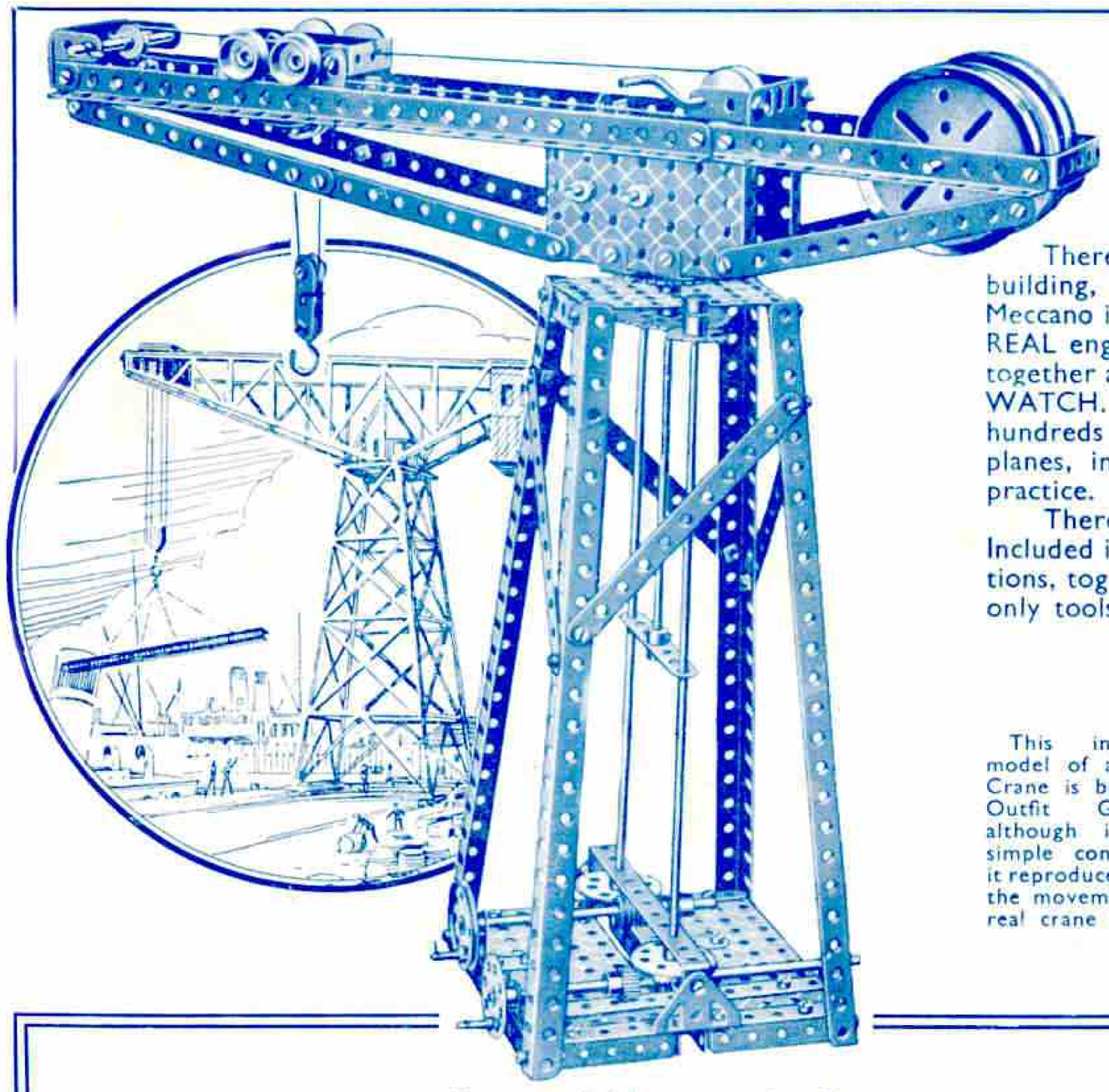
MECCANO MAGAZINE

6D.

MECCANO

BOYS!—BUILD LIKE REAL ENGINEERS!





This interesting model of a Girder Crane is built with Outfit G, and although it is of simple construction it reproduces exactly the movements of a real crane at work.

There is no other hobby in the world to equal Meccano Model-building, and none that is so full of thrilling interest for boys. Meccano is REAL engineering in miniature. The models are built with REAL engineering parts, accurately made of steel and brass, that fit together and work with the SMOOTHNESS AND PRECISION OF A WATCH. These parts can be used over and over again to make hundreds of different models—Cranes, Bridges, Motor Cars, Aeroplanes, in fact almost everything known in modern engineering practice.

There is nothing difficult about Meccano model-building. Included in every Outfit is a splendidly illustrated Manual of Instructions, together with a screwdriver and two spanners, which are the only tools needed. Any boy can start building at once.

B Meccano Outfit. Price 7/6

Prices of Meccano Outfits

COMPLETE OUTFITS

O	Outfit	each	3/6
A	„	„	5/–
B	„	„	7/6
C	„	„	10/–
D	„	„	15/–
E	„	„	20/–
F	„	„	30/–
G	„	„	55/–
H	„ (Carton)	„	72/6
Hw	„ (Cabinet)	„	97/6
K	„ (Carton)	„	132/6
Kw	„ (Cabinet)	„	157/6
L	„ („)	„	400/–

ACCESSORY OUTFITS

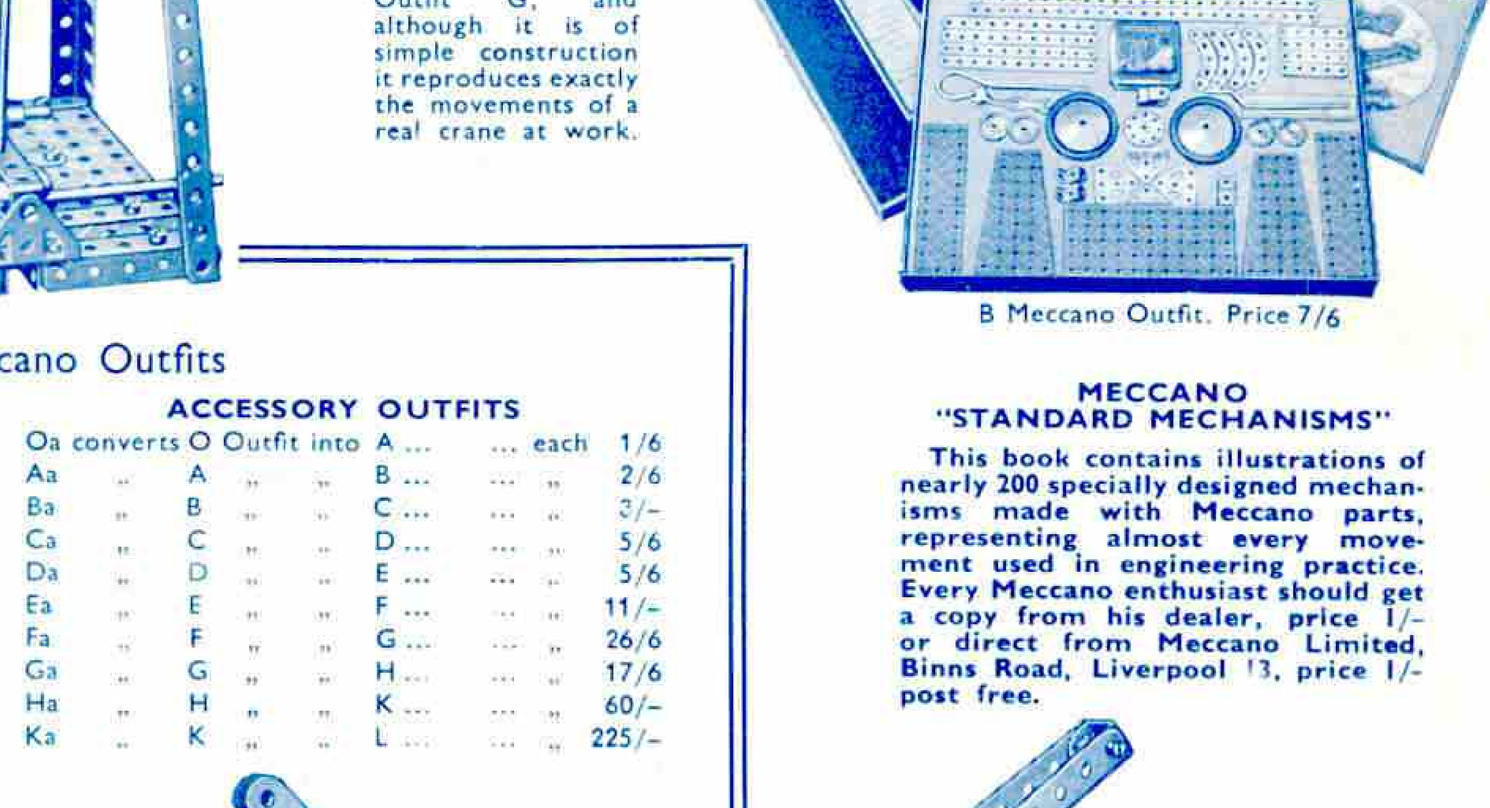
Oa	converts O Outfit into	A	...	each	1/6
Aa	„ A „ „	B	...	„	2/6
Ba	„ B „ „	C	...	„	3/–
Ca	„ C „ „	D	...	„	5/6
Da	„ D „ „	E	...	„	5/6
Ea	„ E „ „	F	...	„	11/–
Fa	„ F „ „	G	...	„	26/6
Ga	„ G „ „	H	...	„	17/6
Ha	„ H „ „	K	...	„	60/–
Ka	„ K „ „	L	...	„	225/–

MECCANO "STANDARD MECHANISMS"

This book contains illustrations of nearly 200 specially designed mechanisms made with Meccano parts, representing almost every movement used in engineering practice. Every Meccano enthusiast should get a copy from his dealer, price 1/– or direct from Meccano Limited, Binns Road, Liverpool 13, price 1/– post free.

E Meccano Outfit. Price 20/–

The simple, but ingenious model of an Excavator illustrated below, is built with Outfit C. Constructed with a minimum of parts it nevertheless performs the operations of an actual Excavator with remarkable realism.



MECCANO LTD., BINNS ROAD, LIVERPOOL 13

EXTRA SPECIAL EDITION

MIDGET POCKET RADIO SET

Hamley's News

·HAMLEY · BROTHERS · LTD · ESTABLISHED · 1760 ·

200-202, REGENT ST., LONDON, W.I. OUR ONLY ADDRESS

No. 44 *November, 1936*

WHAT IS AN EPISCOPE ?

WORLD'S SMALLEST WIRELESS SET

We'll wager you have never seen a radio set this size before. This remarkable little receiver —two and a half inches square, only—operating without batteries or mains, needs only aerial and earth to give first-class reception. TRY IT—you will be amazed at the clear tone and incredible volume. Price only **8/6** Complete with earphones. *Packing and postage 6d.*

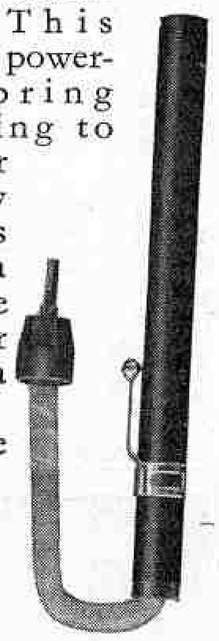
Earphones Full Size

Young Man! Be a Motor Magnate!

The Minic Constructional Set is the answer to every clever boy's dreams. The kit enables you to build six types of Minic all to scale clockwork toys, all parts, including powerful clockwork motor units, are made with precision tools and machines thereby ensuring interchangeability. Each kit is complete with tools, brushes, and enamel in various colours, together with full instructions and is packed in a handsome oak finished cabinet. 18 ins. x 9¾ ins. x 2½ ins. Price Post 1/– **15/-**

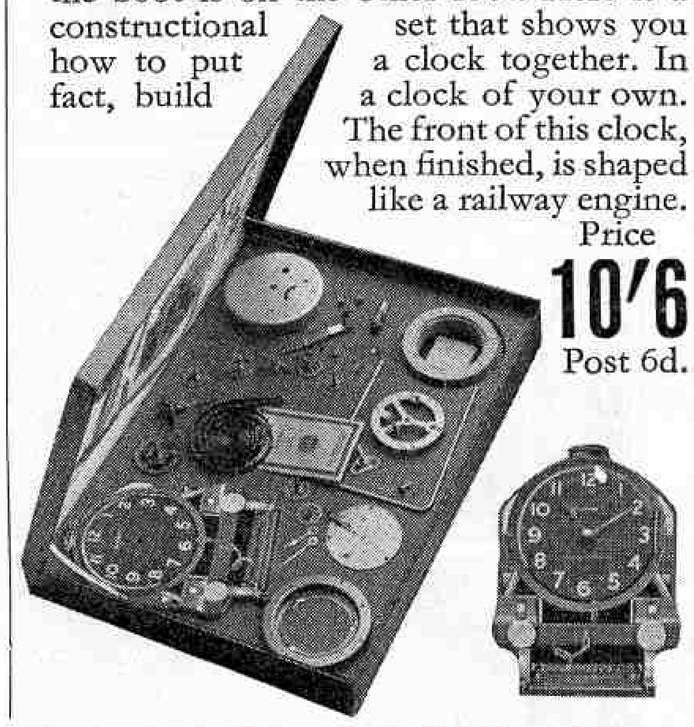
Looks Like Fountain Pen: Is Really 20-yard Aerial

The year's most amazing invention! This aerial, one powerful spring stretching to over twenty yards, fits into a handy case no bigger than a fountain pen. Price **2/6** Post 2d.



CAN YOU MAKE A CLOCK?

A lot of us, at various times, have amused ourselves pulling clocks to pieces. Now the boot is on the other foot. Here is a constructional set that shows you how to put a clock together. In fact, build a clock of your own. The front of this clock, when finished, is shaped like a railway engine. Price **10/6** Post 6d.



NOVEL HOME PHOTO PROJECTOR

This Episcope and Copyscope throws an enlarged size picture on to any screen—just like a film projector. It can be mounted on a tripod, and be pointed straight down on to a sheet of paper, on which you can trace the picture. Four lamp illumination, complete with batteries. Price **12/6** *Foreign.* Post 6d. Ball Socket Adjustable Leg Tripod. Price **11/6.** Post 6d.

FOOL-PROOF STOP-WATCH FOR ONLY 10/-

Accurate to a 1/5th of a second, this stop-watch is a miracle of craftsmanship, yet only costs 10/–. Think of the hours of fun you can have with one of these! Price **10/-** each Post 6d. registered.

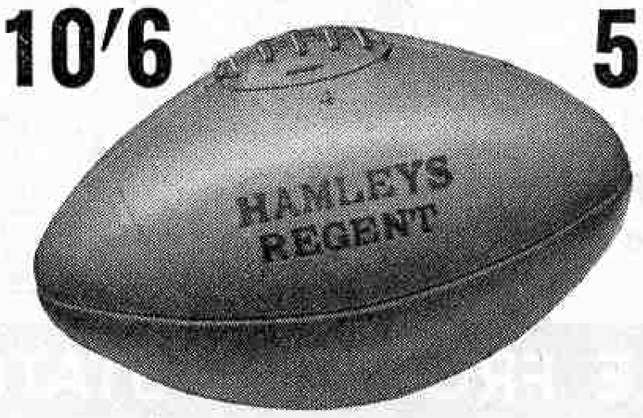
BOY'S WRIST WATCH

A solidly made, well-finished watch that will stand up to any amount of hard wear. Price is only **7/6** Post 6d. registered.

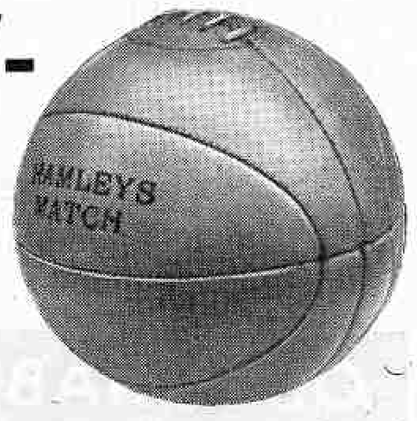
GET A KICK OUT OF RUGGER AND FOOTBALL!

These two balls, rugger and soccer, are real match-winners. Strongly made in specially prepared hide to stand up to any amount of rough usage, each ball is a real bargain for the youthful sportsman. The Rugby ball costs 10/6 and the Soccer ball 5/–. Post 6d.

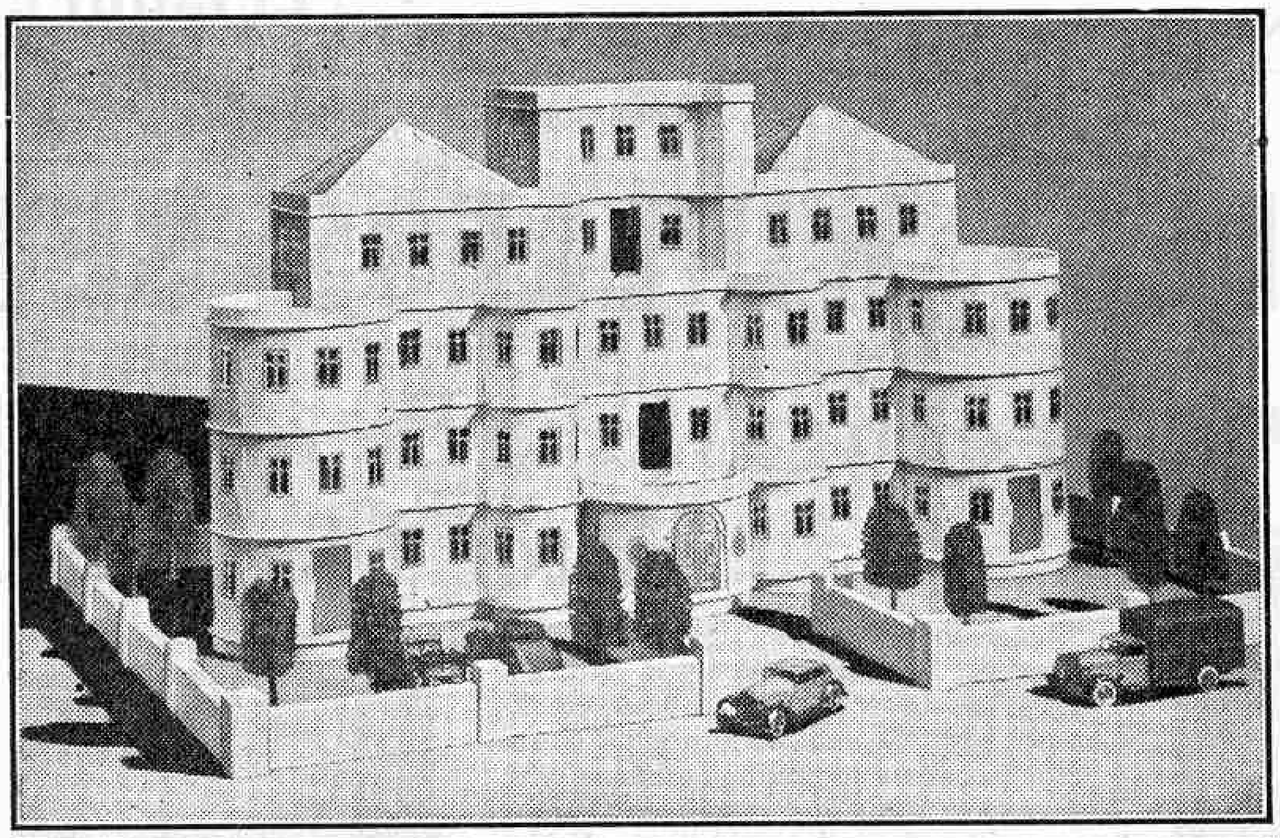
10/6

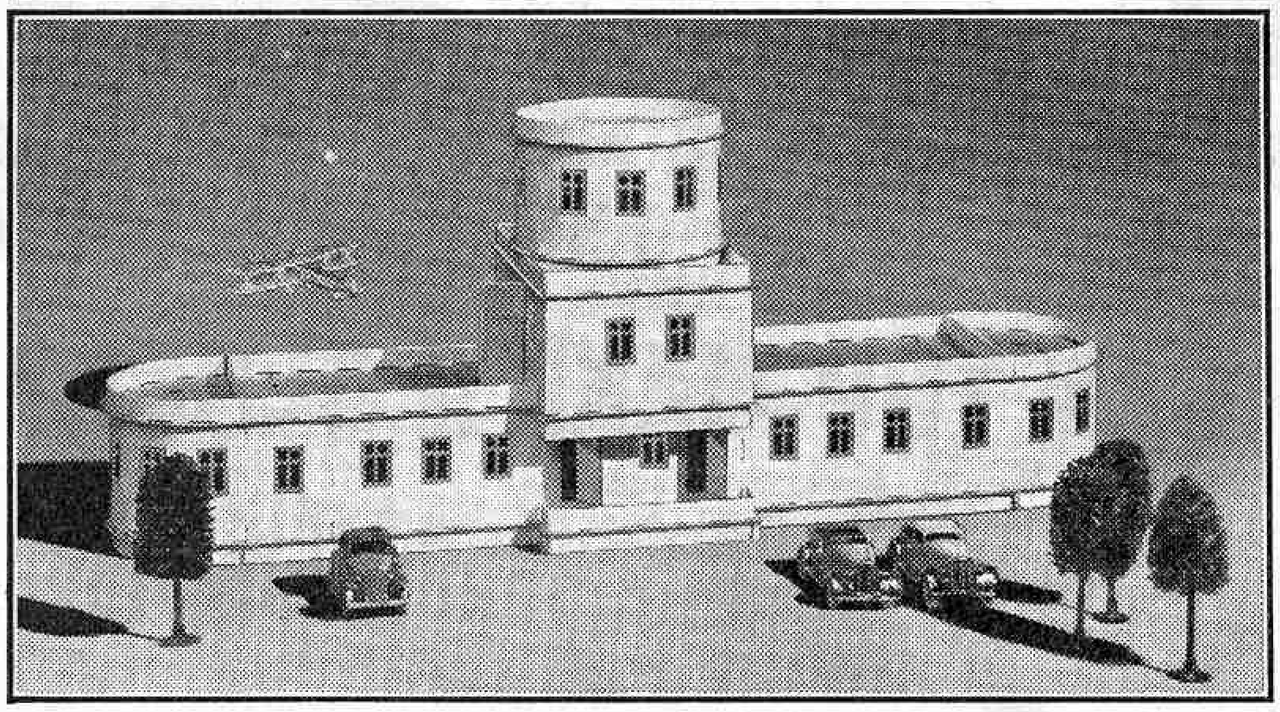


5/-



SAMLO





REALISTIC BUILDING SETS

SAMLO marks a new departure in constructional toys, inasmuch as it provides actual scale models, and gives a perfect reproduction of the building, and not a skeleton effect.

SAMLO is the most complete and instructive hobby ever invented. SAMLO is easy to assemble and easy to dismantle. The same SAMLO parts can be used innumerable times, being made of a special material. Glue, scissors or other tools are not required. SAMLO is an invaluable help to the young architect, constructional engineer and builder of the future.

Complete Outfit "A" **3′6**
Supplementary Outfit "Aa" ... 2/6

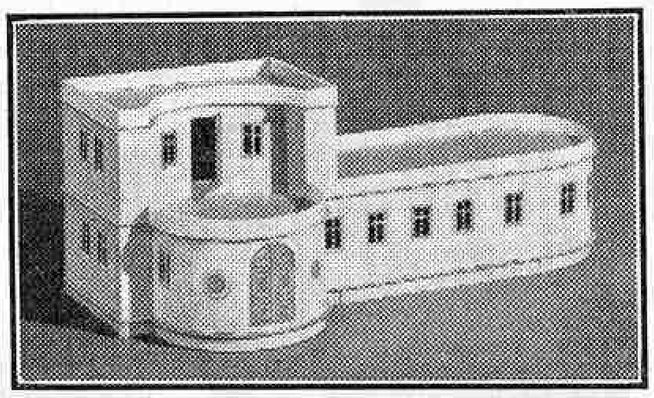
Complete Outfit "B" **5′6**
Supplementary Outfit "Ba" ... 2/6

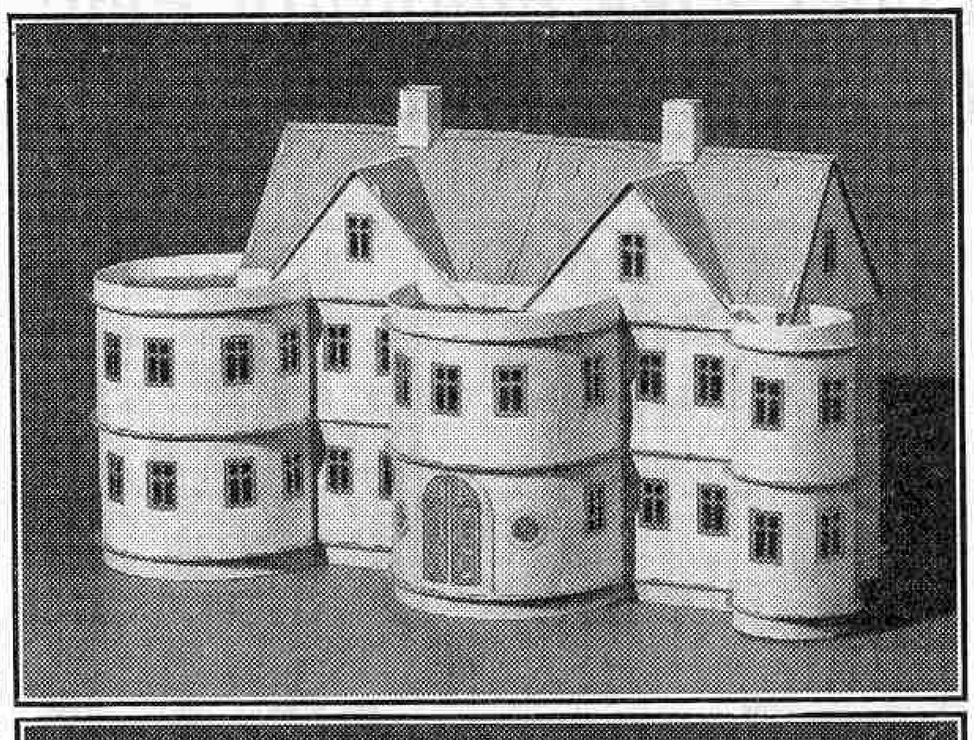
Complete Outfit "C" **7′6**
Supplementary Outfit "Ca" ... 3/6

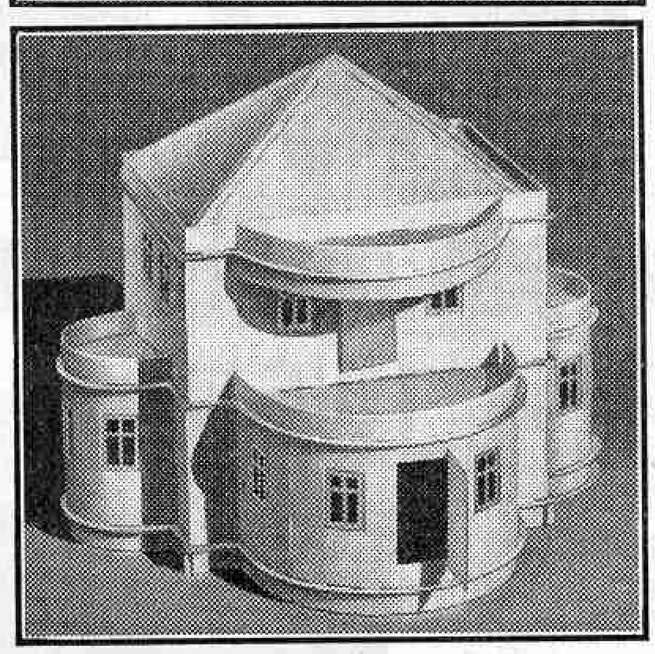
Complete Outfit "D" **10′6**
Supplementary Outfit "Da" ... 12/6

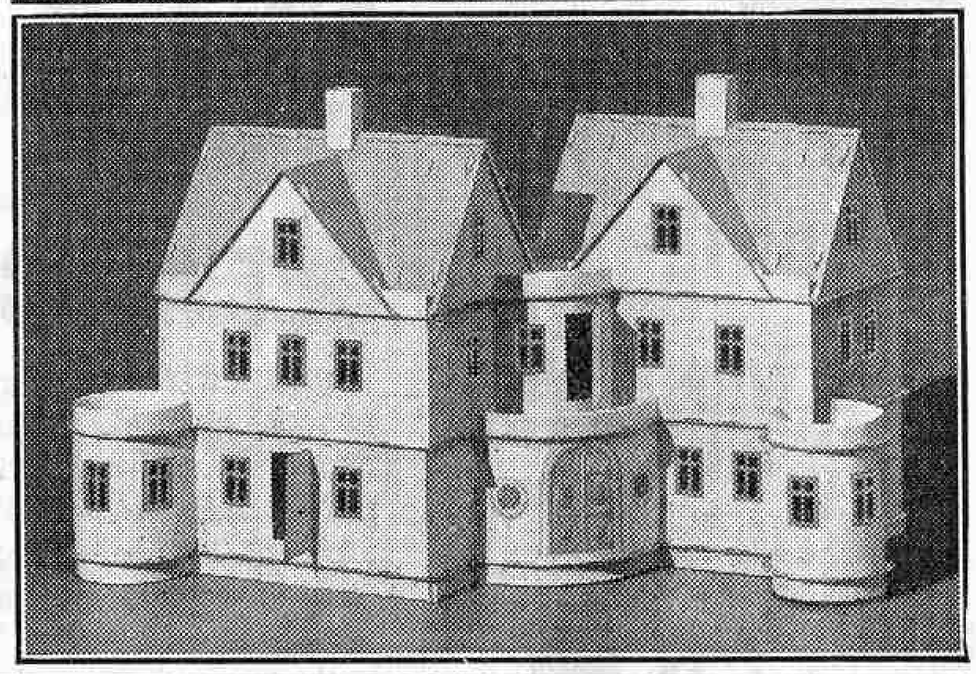
Complete Outfit "E" **21′-**

SAMLO builds realistic Houses, Hotels, Flats, Garages, Fire Stations—in fact, anything that can be built may be portrayed by SAMLO in a life-like manner.





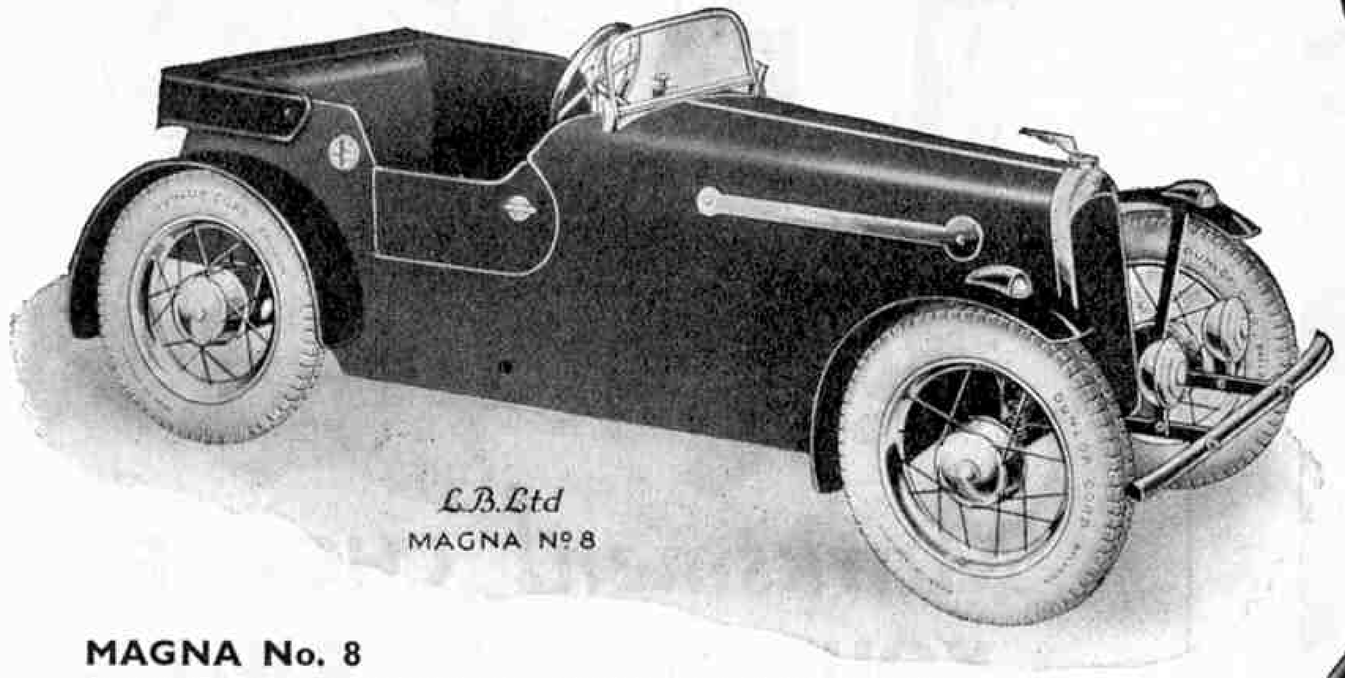




OBTAINABLE FROM ALL STATIONERS, STORES, TOY DEALERS *ETC.*

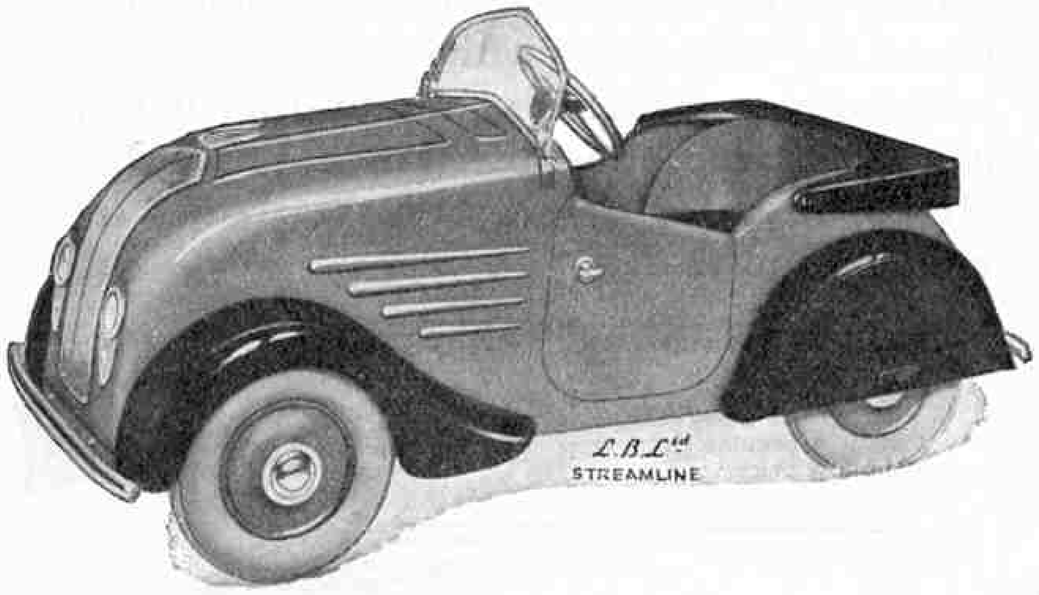
TRI-ANG

THE FINEST TOYS FOR GIRLS AND BOYS



MAGNA No. 8

A magnificent new sporting car. Coach-built body fully sprung. Ball-bearing back axle. Opening side door, windscreen, dummy hood and lamps. Tubular bumper. Dunlop pneumatic tyres on tangent spoke wheels. All bright parts CHROMIUM PLATED, including hubs and rims, louvres, bumper and streamline mascot. Length 54 in. RETAIL PRICE **115/-**

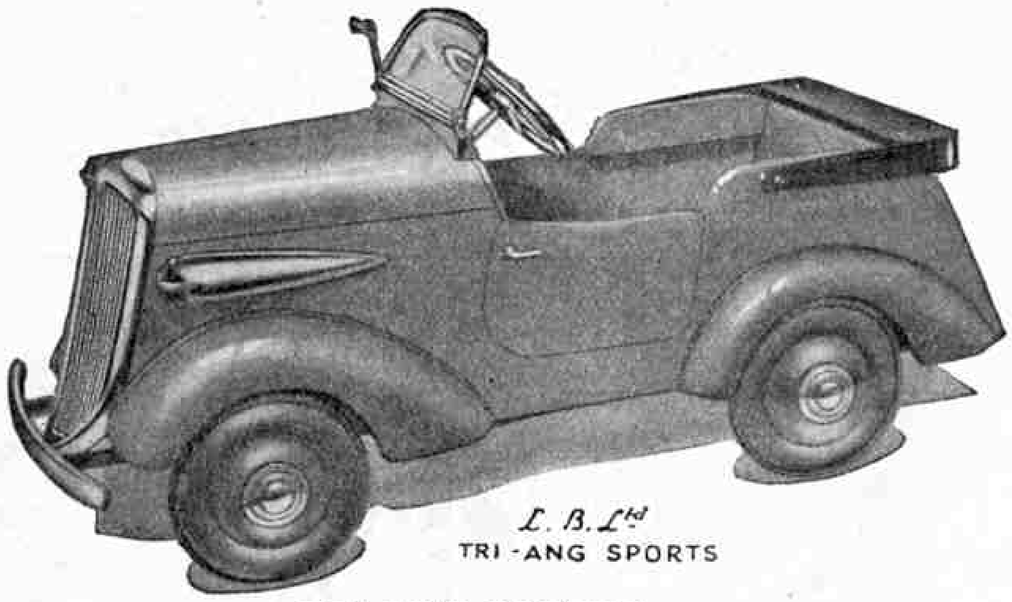


STREAMLINE

A real streamline body made of steel. Crank drive on ball-bearing back axle. Facsimile airflow radiator. Four dummy lamps. Tubular bumpers back and front. Windscreen and direction indicator. Balloon disc wheels and rubber tyres. Length 45 in. RETAIL PRICE **55/-**

TRI-ANG "FAIRYCYCLE" (Regd.) MODEL No. 2

Tubular frame. 14 in. wheels. 1¾ in. grey imitation pneumatic tyres. Ball-bearing pedals. Rim brake. Two coil saddle. Chain cover. Stand. CHROMIUM-PLATED FITTINGS. Black, blue or maroon. RETAIL PRICE **39/6**
OTHER MODELS **35/-, 39/6, 45/-, 49/6, 63/-, 67/6, 90/-**

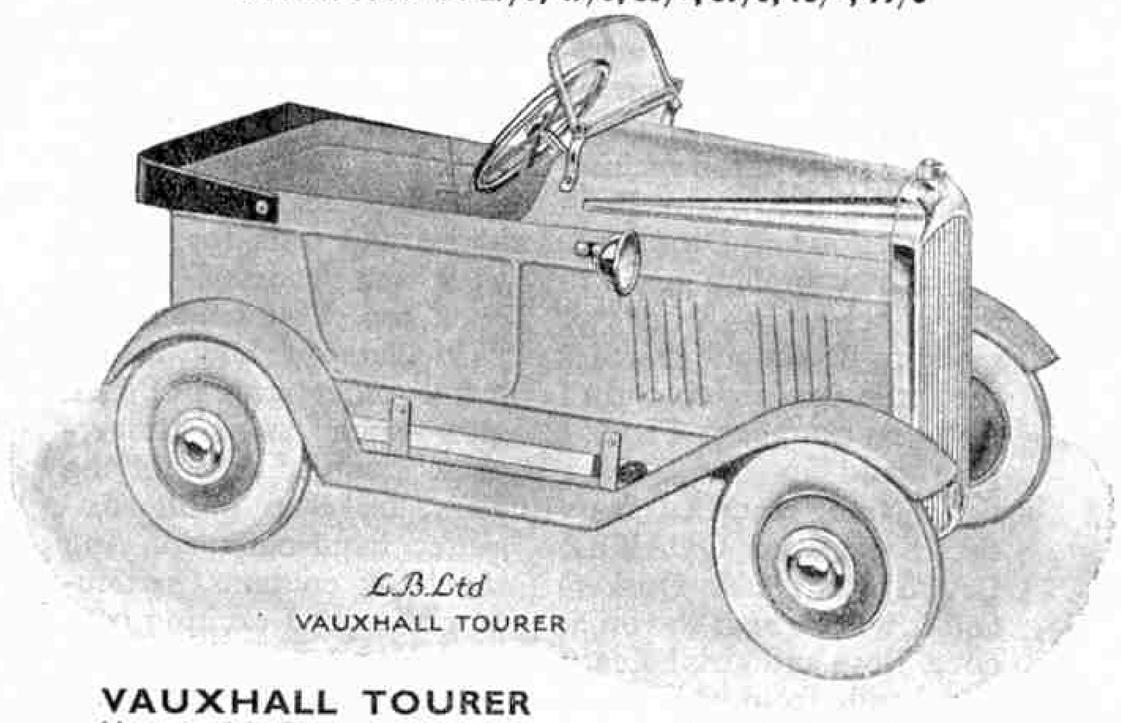


TRI-ANG SPORTS

Entirely new streamline model. All steel body, with luggage boot and opening side door. 8 in. balloon disc wheels, ¼ in. rubber tyres. Plated bumper and streamline dummy side lamps. Windscreen, direction indicator and dummy hood. Length 41 in. RETAIL PRICE **32/6**

TRI-ANG TRICYCLE No. 5 (Regd. Trade Mark)

FITTED WITH REAR MUDGUARDS. Cycle chain drive with free-wheel. Frame best quality weldless cycle tubing. 14 in. wheels. 1¾ in. jointless sponge-rubber tyres. Rim brake. Coil-spring saddle. CHROMIUM FITTINGS. Black, blue or maroon. RETAIL PRICE **59/6**
OTHER MODELS **29/6, 49/6, 55/-, 59/6, 75/-, 99/6**



VAUXHALL TOURER

New model. Pressed steel body with opening side door. Windscreen, dummy hood, facsimile Vauxhall bonnet and radiator. 8 in. balloon disc wheels, ¼ in. rubber tyres. Two dummy side lamps. Petrol and oil cans. Length 32 in. RETAIL PRICE **22/6**

Ask your dealer for the 1936/37 coloured Tri-ang Toy Folder

Reg. Trade Mark

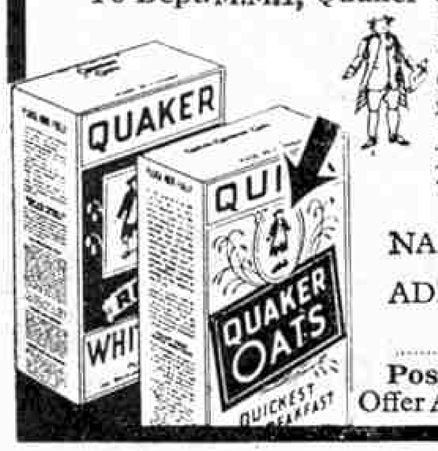
LINES BROS. LTD.
Tri-ang Works
Morden Rd., London, S.W.19

Reg. Trade Mark

CLUES! FINGER-PRINTS! SECRETS and THRILLS OF THE FLYING SQUAD . . . as actually related by the former Flying-Squad Chief! These are only some of the exciting sections of the Master Book of Detection and Disguise—the most complete guide to the fascinating work of modern detection ever issued in a convenient form! And you can get it FREE! Just send in the Quaker figure (trade mark) cut from two packets of QUAKER OATS (or *Quick* Quaker) and it will be sent to you at once. Boys and girls! Learn first-hand, from this book written by Ex-Detective-Inspector Grosse, formerly head of the famous and dreaded Flying-Squad, just how to start NOW learning to be a detective! There are lots of splendid mysteries, problems and tests for you to work out yourself in the book, too. You will find full particulars of how to get many other grand FREE gifts—such as a finger-print outfit, magnifying glass, make-up outfit, disguises, hand-cuffs, etc. And the book contains particulars of several exciting contests which you can enter and *win prizes*. See about getting *yours* now!

CUT OUT AND POST THIS COUPON *To-day!*

To **Dept. M.M.1, Quaker Oats Ltd., Southall, Middlesex**



I enclose the Quaker figures cut from the front of two packets of Quaker Oats (or *Quick* Quaker). Please send me my free copy of the MASTER BOOK OF DETECTION AND DISGUISE.

WRITE IN CAPITAL LETTERS

NAME .....

ADDRESS .....

.....

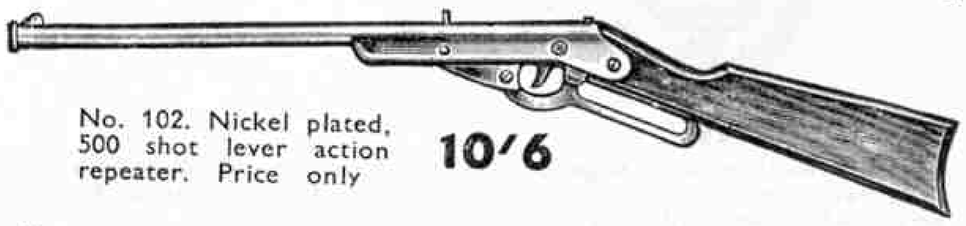
Post in 1½d. stamped, sealed envelope.
Offer Applies in Gt. Britain & N. Ireland only

250A

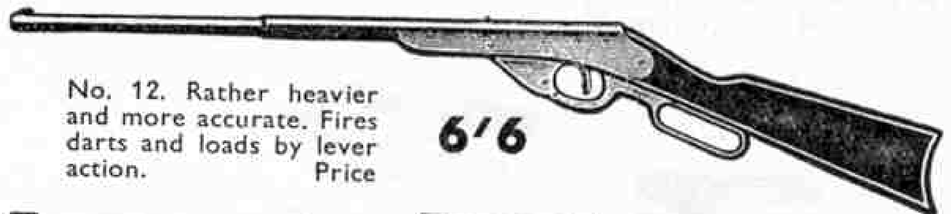
Marksmen! CHOOSE YOUR "DAISY" RIFLE

Every "big game" hunter acquires his skill shooting at the mark. The urge to excel in marksmanship comes to every man early in life. Have you experienced it? *** Find out who has the steadiest nerves and the keenest eyes in your group of friends. Each can select, from those listed below, the "Daisy Air Rifle" which suits him best. Start this sporting competition to-day.

No. 101. Daisy Single Shot. A genuine Daisy at this low price **6/6**

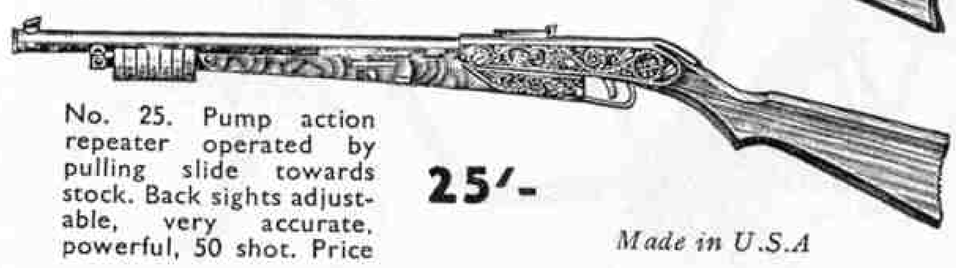


No. 102. Nickel plated, 500 shot lever action repeater. Price only **10/6**



No. 12. Rather heavier and more accurate. Fires darts and loads by lever action. Price **6/6**

No. 195. "Buzz Barton Special" with famous telescopic type sights, level action. Price **12/6**



No. 25. Pump action repeater operated by pulling slide towards stock. Back sights adjustable, very accurate, powerful, 50 shot. Price **25/-**

Made in U.S.A

Booklet of Models sent FREE, *address:*

ROLLINS and SONS (London) LTD.
17, ST. BRIDE STREET, LONDON, E.C.4

1886 ★ GOLDEN JUBILEE ★ 1936 DAISY AIR RIFLES

STOCKED BY ALL LEADING CYCLE AND SPORTS DEALERS

LEARN TO FLY WITH THE FROG MK IV

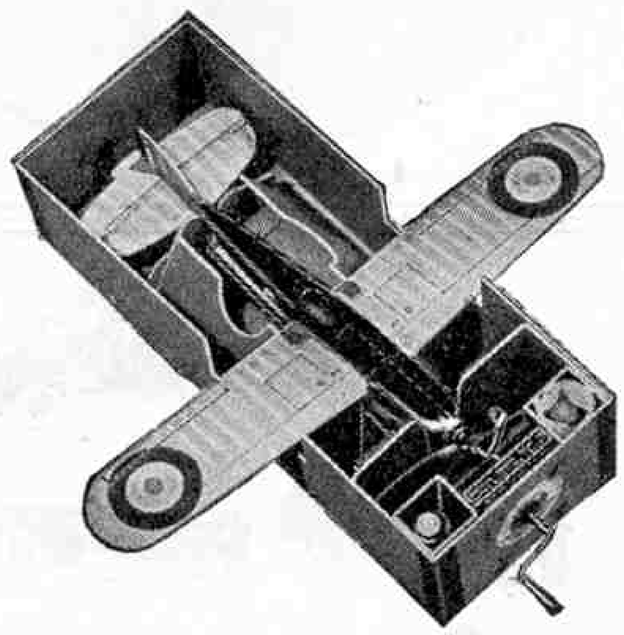
TRADE MARK REGD.

ONLY **5/-**

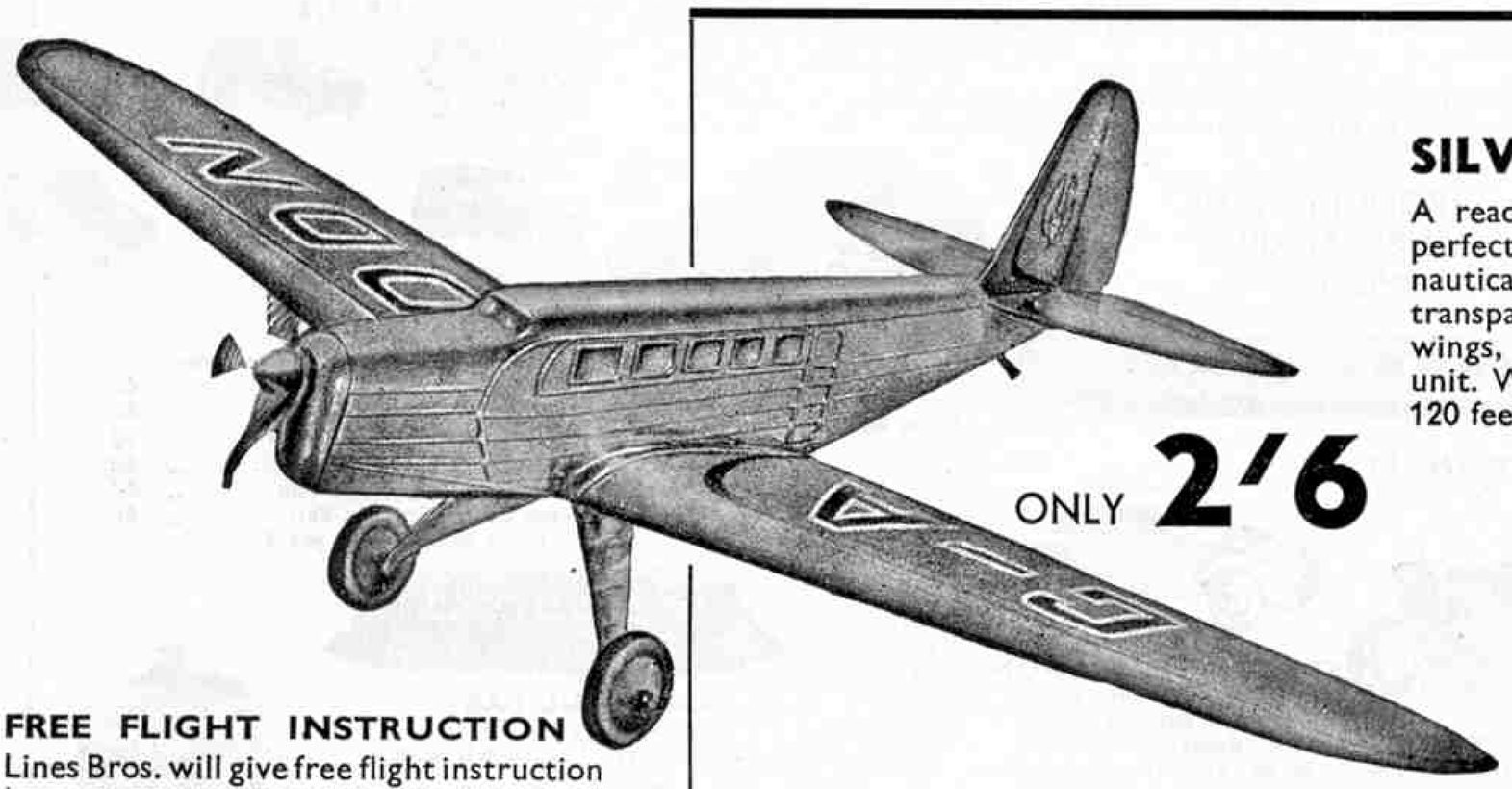
FROG MK IV INTERCEPTOR FIGHTER

All metal fuselage of tubular construction, quickly detachable under-carriage and hollow wings. Powerful motor coupled to a precision cut gear-box, accurately carved airscrew. Complete with Patent High Speed Winder Box, motor lubricant, gear-box oil, two spare motors and insertor rod, and fully illustrated flying manual. Wing span 11½". With practice it will rise off the ground and fly 300 feet.

This illustration shows how quickly the Frog scale models are wound for flight with the geared-up winder box. A PATENT AND EXCLUSIVE "FROG" FEATURE.



A REAL FLYING MODEL FOR HALF-A-CROWN



ONLY **2'6**

SILVER ARROW

A ready to fly model specially designed and perfectly made by the famous "FROG" Aeronautical Engineers. It has an aluminium fuselage, transparent windows, double surface detachable wings, correct pitch air screw, adjustable tail unit. Wing span 16½ in., will fly approximately 120 feet.

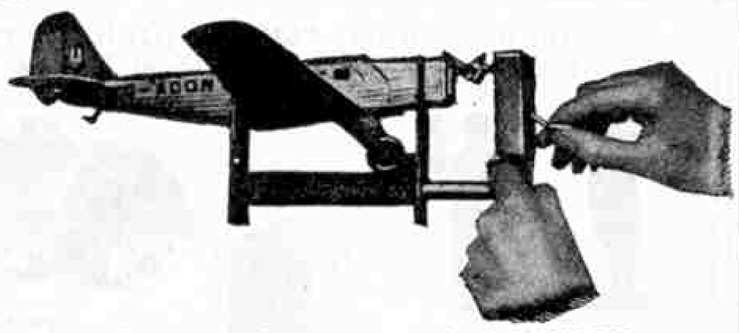


Illustration shows how easily the "SILVER ARROW" can be wound ready for flight with the Patent Geared-up Hand Winder. Price **1/-**

FREE FLIGHT INSTRUCTION
Lines Bros. will give free flight instruction by appointment on the Frog Aerodrome at Merton. Telephone: Liberty 1041.

FROG MODEL AIRCRAFT

Designed and made by The International Model Aircraft Ltd. Patented throughout the world. Sole concessionaires:

LINES BROS. LTD., Tri-ang Works, Morden Road, Merton, London, S.W.19

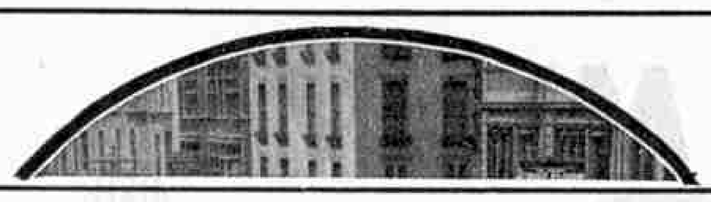
COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19.

Please send me your new "Frog" coloured leaflet with particulars of the "Frog" Flying Club and of how to obtain handsome enamelled Air Force pilot Badges.

Name .....

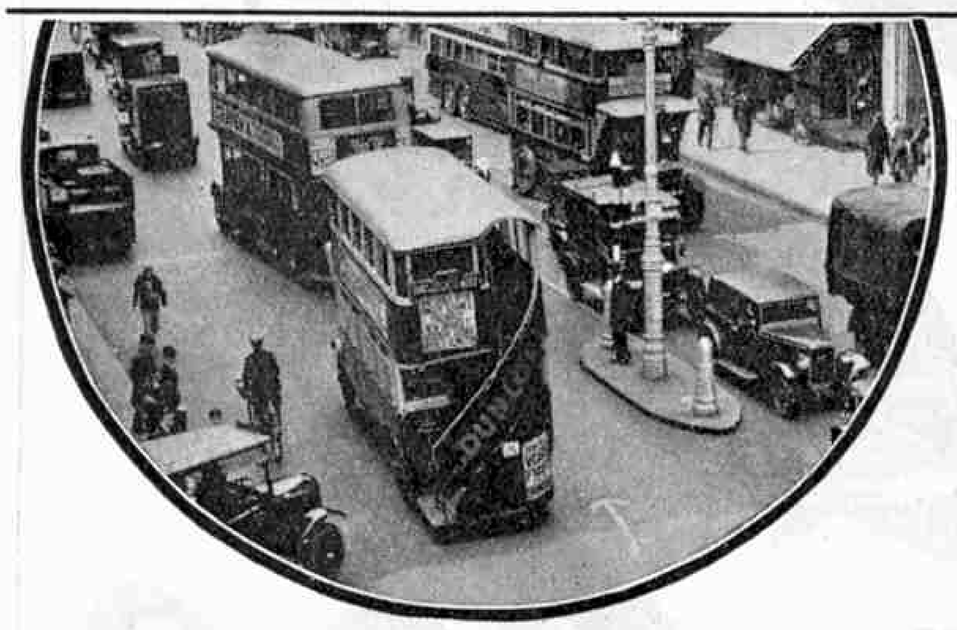
Address .....

Please write in block letters. 11/36



DINKY TOYS

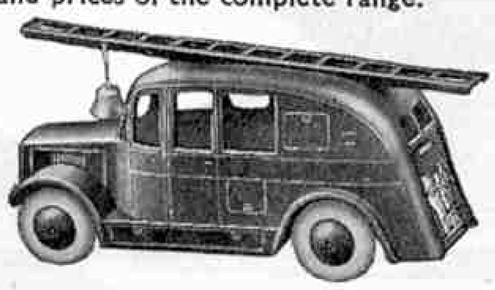
A CHARMING COLLECTING HOBBY



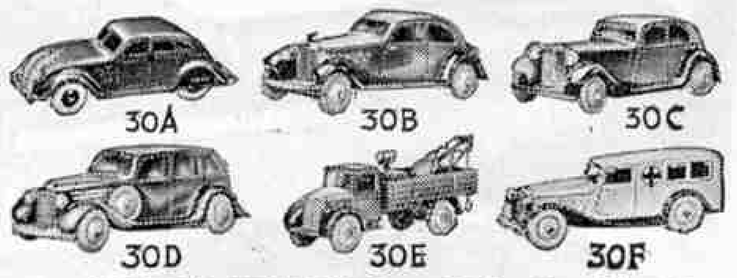
A FASCINATING COLLECTING HOBBY

Dinky Toys are the most realistic and the most attractive models in miniature ever produced. These wonderful toys are unique in their perfection of finish, and their range is so wide as to appeal to all tastes. A selection is illustrated on these pages and as will be seen trains, motor vehicles, aeroplanes, famous liners, etc., are already included in the range. Many other models of equal interest are in preparation.

ASK YOUR DEALER FOR A COPY OF THE DINKY TOYS FOLDER which gives illustrations and prices of the complete range.



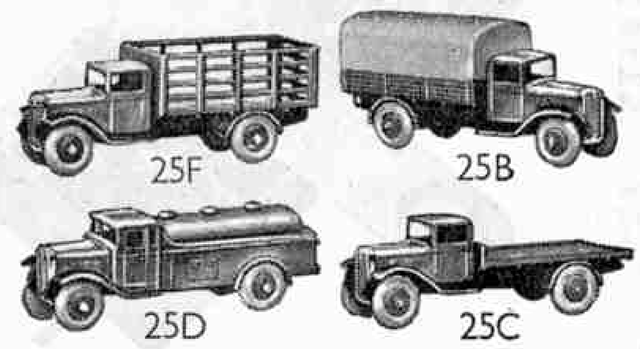
STREAMLINE FIRE ENGINE
Dinky Toys No. 25h
Fitted with detachable rubber tyres
Price **9d.** each

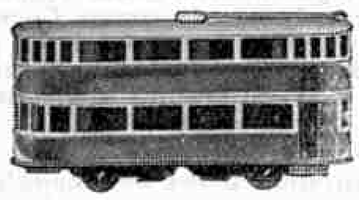


MOTOR VEHICLES Dinky Toys No. 30
Fitted with detachable rubber tyres and silver-plated radiators

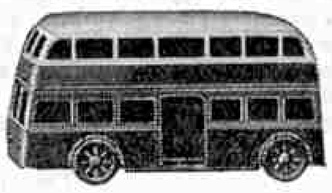
No. 30a	Chrysler Airflow Saloon	each	**9d.**
No. 30b	Rolls-Royce Car	,,	**9d.**
No. 30c	Daimler Car	,,	**9d.**
No. 30d	Vauxhall Car	,,	**9d.**
No. 30e	Breakdown Car	,,	**9d.**
No. 30f	Ambulance	,,	**9d.**

Price of complete set **4/6**



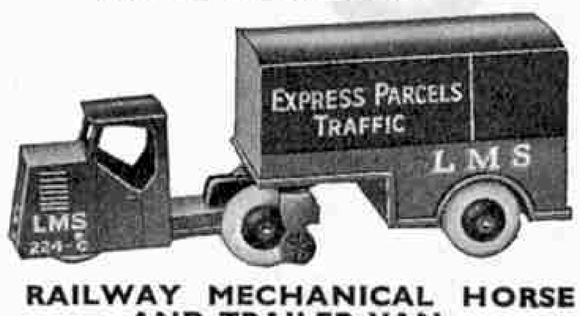


TRAM CAR
Dinky Toys No. 27
Assorted colours
Price **3d.** each



MOTOR BUS
Dinky Toys No. 29a
Assorted colours
Price **4d.** each

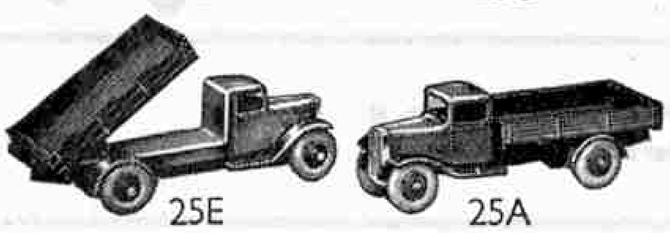
PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price **3d.** each



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Fitted with detachable rubber tyres

No. 33Ra	Railway Mechanical Horse	each	**8d.**
No. 33Rd	Trailer Van... ...	,,	**10d.**

Price, complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., **1/6**



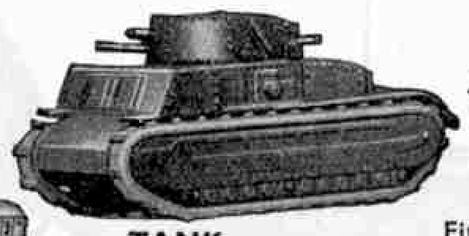
COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25
Fitted with detachable rubber tyres and silver-plated radiators

No. 25a	Wagon	each	**9d.**
No. 25b	Covered Van ...	,,	**9d.**
No. 25c	Flat Truck	,,	**9d.**
No. 25d	Petrol Tank Wagon	,,	**9d.**
No. 25e	Tipping Wagon ...	,,	**9d.**
No. 25f	Market Gardener's Van	,,	**9d.**

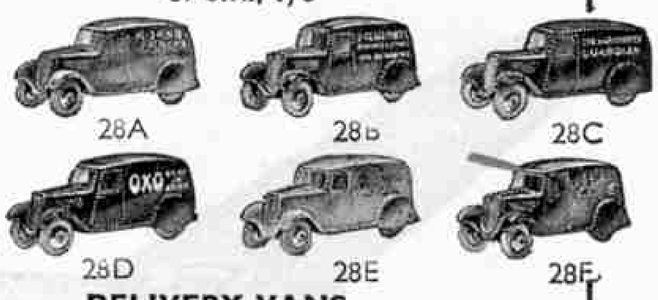
Price of complete set **4/6**

CUNARD WHITE STAR LINER "QUEEN MARY"
Dinky Toys No. 52a
Fitted with rollers and supplied in presentation box. Price **1/-** each
Dinky Toys No. 52m
Similar to No. 52a but not fitted with rollers, nor supplied in presentation box. Price **9d.** each

STRONGLY MADE
UNBREAKABLE
MODELS



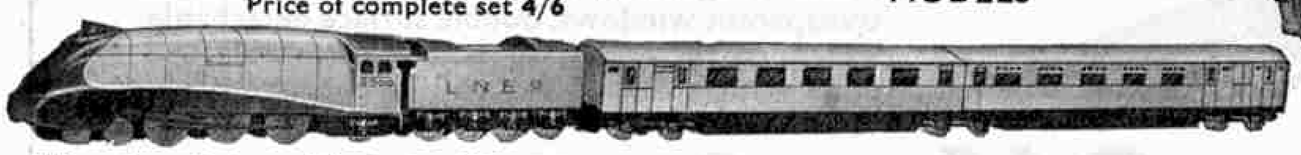
TANK
Dinky Toys No. 22f
Price **9d.** each



DELIVERY VANS
Dinky Toys No. 28/1
Fitted with detachable rubber tyres

No. 28a	Golden Shred Van ...	each	**6d.**
No. 28b	Seccotine Van	,,	**6d.**
No. 28c	Manchester Guardian Van	,,	**6d.**
No. 28e	Firestone's Tyres Van ...	,,	**6d.**
No. 28f	Palethorpe's Sausage Van	,,	**6d.**
No. 28n	Atco Lawn Mowers Van ...	,,	**6d.**

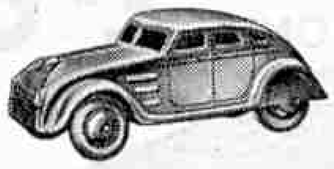
Price of complete set **3/-**



A realistic model of the latest type of streamline train

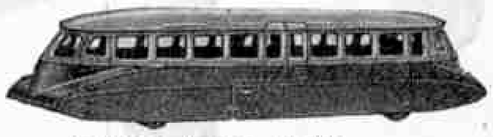
"SILVER JUBILEE" TRAIN SET
Dinky Toys No. 16
Price **1/6** each

TRACTOR
Dinky Toys No. 22e
Price **9d.** each

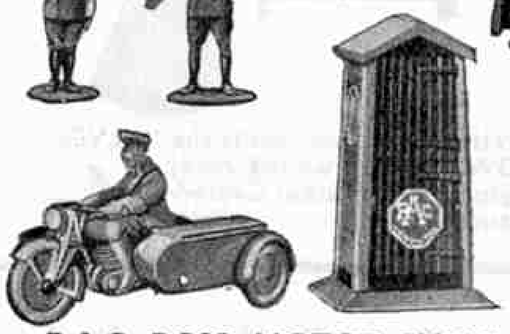


STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres and silver-plated radiator. Price **6d.** each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a (Four face) Price **3d.** each
No. 47b (Three face) Price **3d.** each
No. 47c (Two face) Price **3d.** each



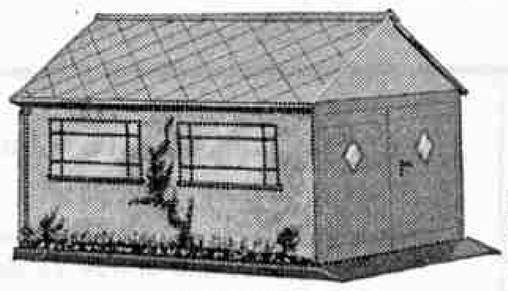
G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours Price **4d.** each



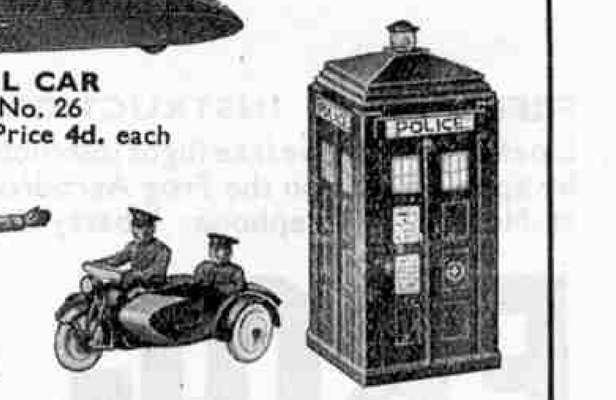
R.A.C. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar personnel and road hut of the R.A.C. Each item is finished in correct colours.

No. 43a	R.A.C. Box	each	**6d.**
No. 43b	R.A.C. Motor Cycle Patrol	,,	**9d.**
No. 43c	R.A.C. Guide directing traffic	,,	**3d.**
No. 43d	R.A.C. Guide at the salute	,,	**3d.**

Price of complete set **1/9**



GARAGE
Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars. Price **1/6** each



POLICE BOX, MOTOR CYCLE PATROL AND POLICEMEN
Dinky Toys No. 42

No. 42a	Police Box	each	**6d.**
No. 42b	Motor Cycle Patrol	,,	**10d.**
No. 42c	Point Duty Policeman (in White Coat)	,,	**3d.**
No. 42d	Point Duty Policeman	,,	**4d.**

Price of complete set **1/11**

FINISHED IN RICH COLOURS DINKY TOYS

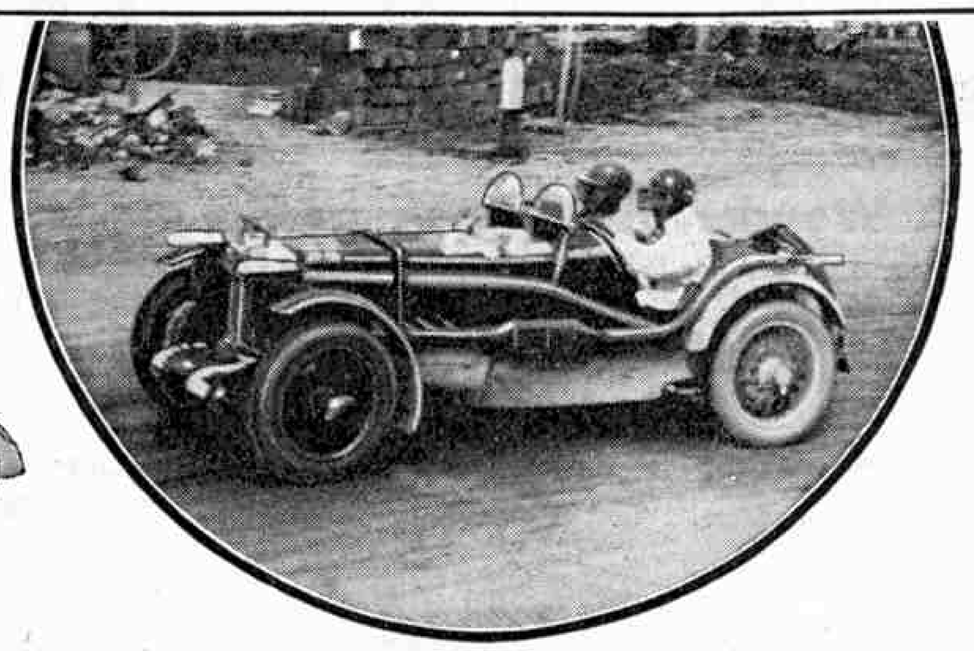
SMALL CARS
Dinky Toys No. 35
Fitted with rubber tyres

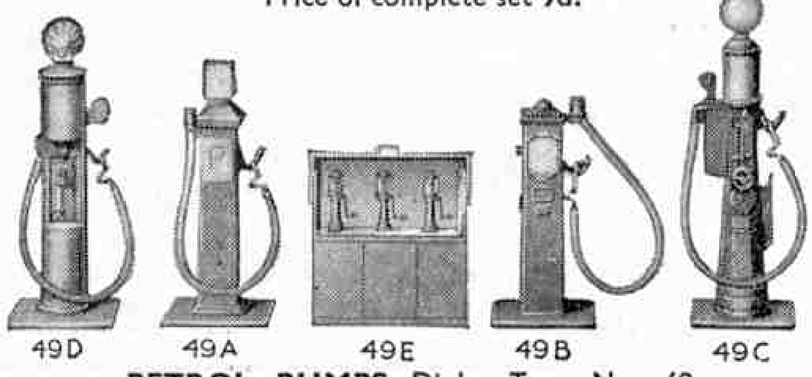
No. 35a	Saloon Car	each	3d.
No. 35b	Racer...	,,	3d.
No. 35c	"M.G." Sports Car	,,	3d.

Price of complete set **9d.**

HOTCHKISS RACING CAR
Dinky Toys No. 23b
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

RACING CAR
Dinky Toys No. 23a
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each





49D 49A 49E 49B 49C

PETROL PUMPS Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Realistically coloured.

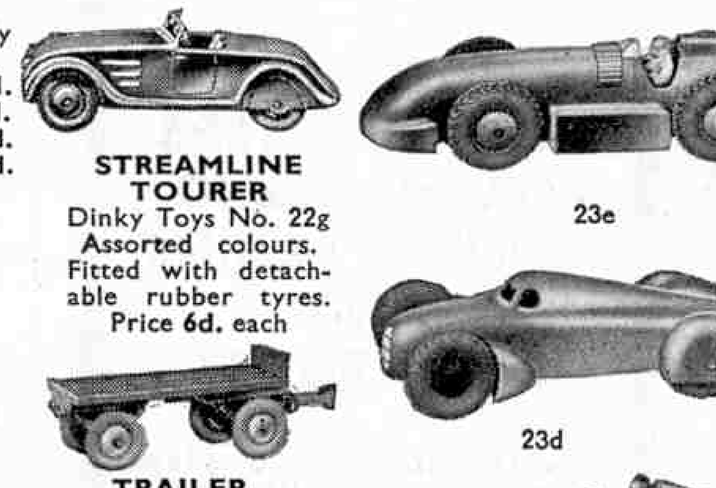
No. 49a	Bowser Pump	each	4d.
No. 49b	Wayne Pump	,,	4d.
No. 49c	Theo Pump each **4d.** No. 49d Shell Pump	,,	4d.
No. 49e	Oil Bin (Pratts)	,,	3d.

Price of complete set **1/6**

CARAVAN TRAILER
Dinky Toys No. 30g
For use with the Saloon Cars in Dinky Toys No. 24 and 30. Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

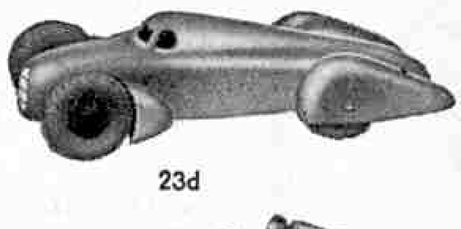
PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price **3d.** each

TRAILER
Dinky Toys No. 25g
For use with Dinky Toys No. 25 (Commercial Motor Vehicles). Fitted with detachable rubber tyres. Price **7d.** each

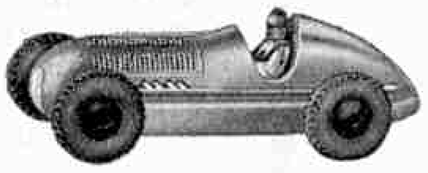


STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

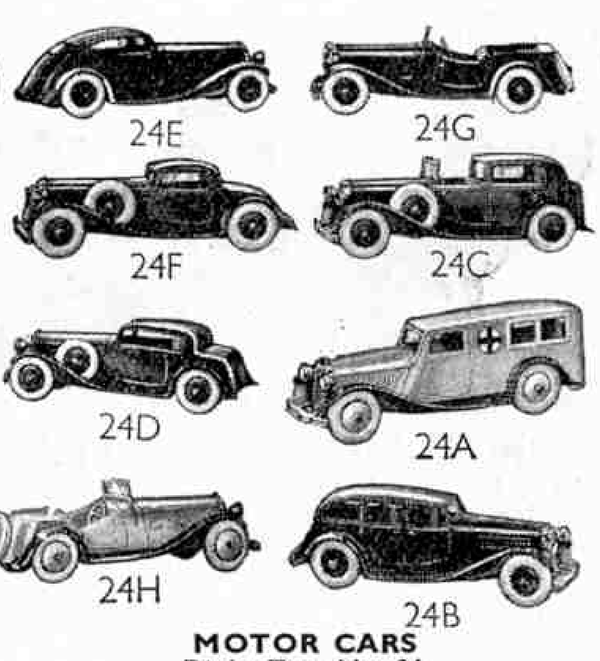
23e



23d



23c

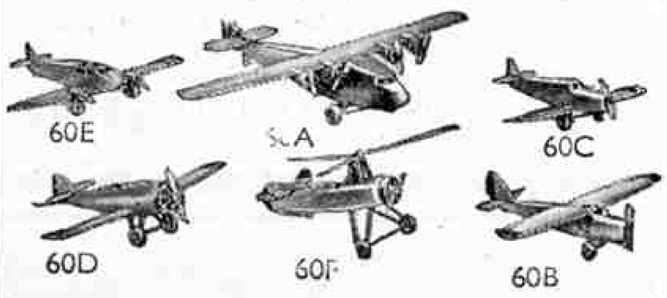


24E 24G 24F 24C 24D 24A 24H 24B

MOTOR CARS
Dinky Toys No. 24
Fitted with detachable rubber tyres and silver-plated radiators

No. 24a	Ambulance	each	9d.
No. 24b	Limousine	,,	9d.
No. 24c	Town Sedan ...	,,	9d.
No. 24d	Vogue Saloon ...	,,	9d.
No. 24e	Super Streamline Saloon	,,	9d.
No. 24f	Sportsman's Coupé	,,	9d.
No. 24g	Sports Tourer (4 seater)	,,	9d.
No. 24h	Sports Tourer (2 seater)	,,	9d.

Price of complete set **6/-**



60E 60A 60C 60D 60F 60B

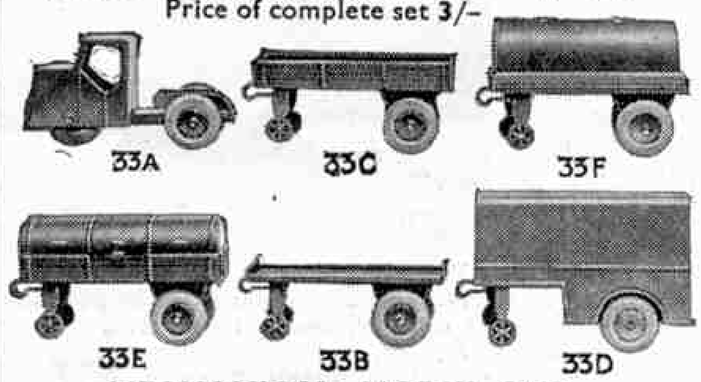
AEROPLANES Dinky Toys No. 60

No. 60a	Imperial Airways Liner	each 9d.
No. 60b	D.H. "Leopard Moth"	,, 6d.
No. 60c	Percival "Gull" ...	,, 6d.
No. 60d	Low Wing Monoplane	,, 6d.
No. 60e	General "Monospar"	,, 6d.
No. 60f	Cierva "Autogiro" ...	,, 6d.

Price of complete set **3/-**

ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
In correct colours. Fitted with detachable rubber tyres.
Price **6d.** each

MOTOR TRUCK
Dinky Toys No. 22c
Assorted colours. Fitted with detachable rubber tyres. Price **6d.** each



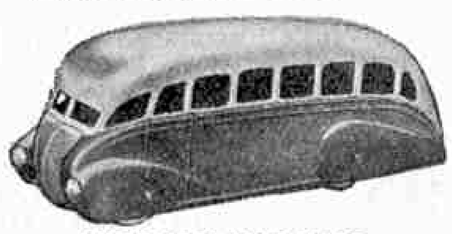
33A 33C 33F 33E 33B 33D

MECHANICAL HORSE AND FIVE ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with detachable rubber tyres

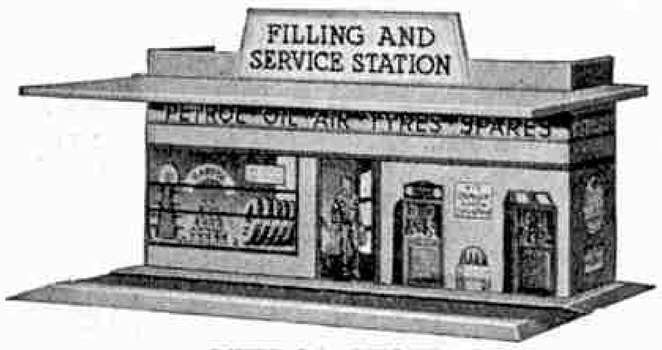
No. 33a	Mechanical Horse ...	each	6d.
No. 33b	Flat Truck	,,	6d.
No. 33c	Open Wagon ...	,,	6d.
No. 33d	Box Van	,,	8d.
No. 33e	Dust Wagon ...	,,	8d.
No. 33f	Petrol Tank	,,	8d.

Price of complete set **3/6**

BEACON
Dinky Toys
No. 47d
Realistic model of a Belisha Safety Beacon
Price **1d.** each



STREAMLINE BUS
Dinky Toys No. 29b
Fitted with rubber tyres
Price **6d.** each



PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Tastefully printed in appropriate colours.
Price **1/6** each

RACING CARS
Dinky Toys No. 23
Fitted with driver and detachable racing tyres. Assorted colours.

No. 23c	Mercedes-Benz Racing Car	each	8d.
No. 23d	Auto-Union Racing Car	,,	8d.
No. 23e	"Speed of the Wind" Racing Car	,,	8d.

Price of complete set **1/11**

A.A. BOX, MOTOR CYCLE, PATROL AND GUIDES
Dinky Toys No. 44
Collectors of Dinky Toys will find this new addition to the range of particular interest. Each item is finished in correct colours.

No. 44a	A.A. Box	each	8d.
No. 44b	A.A. Motor Cycle Patrol	,,	9d.
No. 44c	A.A. Guide directing traffic	,,	3d.
No. 44d	A.A. Guide at the salute	,,	3d.

Price of complete set **1/11**

THE NAME Gamages GUARANTEES THE VALUE

GAMAGES

GIANT CHRISTMAS BAZAAR

BEGINS NOV. 2nd

A Wonderful Journey to the Lucky Dip

A thrilling ride to the Silver Forest in the Magic North by the famous

L.N.E.R.'s "SILVER JUBILEE" TRAIN

Hauled by the Magnificent Streamlined Locomotive

"SILVER LINK"

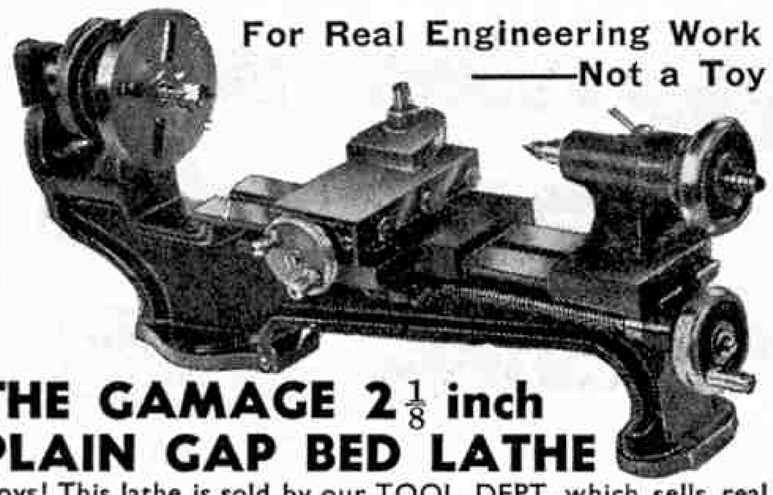
Father Christmas will greet you on arrival and present the good things from his lucky dip of golden gifts. The most realistic attraction ever presented in a Store.

FAMOUS LONDON CIRCUS OPENS NOV. 16th

A LONG ROUND OF THRILLS AND FUN

Times of Performances, etc., sent on request

BOOK YOUR SEATS NOW



For Real Engineering Work ——Not a Toy

THE GAMAGE 2⅛ inch PLAIN GAP BED LATHE

Boys! This lathe is sold by our TOOL DEPT. which sells real engineering tools only, so you can well understand that despite its low price it is not a toy. Treadle or power operated. Length between centres 10", Face-plate 3⅜" diameter, Height of centres from Gap 2¼", Slide Rest with Vee slide, Square Thread Lead Screw. The Headstock Hollow Mandrel is bored ½". Mandrel nose ½" x 16 threads and bored No. O Morse Taper. Weight of lathe 18 lbs.

Foot Motor, **18/6**
½ h.p. Electric Motor, **50/-**. Driving Pulley, **4/-**
Countershaft, **12/6**

Carriage 2/- outside our extensive delivery area.

37/6

NATIONAL HEADQUARTERS FOR MECCANO, HORNBY TRAINS AND SPEED BOATS

Greatly enlarged displays of the above will be an outstanding feature of Gamages Christmas Bazaar.

SEE THE HUGE HORNBY LAYOUT WITH WORKING MODEL TRAINS

GAMAGES ARE THE LEADING MODEL AEROPLANE SPECIALISTS.

WARNEFORD, F.R.O.G. AND "SKYBIRD" DEMONSTRATIONS DAILY

THE "DE HAVILLAND" HORNET MOTH CONSTRUCTIONAL KIT

All difficult cutting out already done for you. All parts accurately cut to shape and only need to be assembled. An easy-to-follow illustrated constructional Chart is supplied with each Kit, together with sufficient dope, cement and motor lubricant.

3/6

5 ft. OAK RAIL BILLIARD TABLE FOR ONLY 49/6

Best quality laminated bed, tested for accuracy and strongly battened to obviate warping. **Solid Oak Cushion Rails** in attractive heavy design, highly polished Dark colour. Solid Para rubber cushions, positioned to ensure maximum resiliency and billiard-table "angle" accuracy. Bed and cushions covered with splendid quality English woven cloth. Brassed pocket plates leather covered and fitted cord pocket nets. Adjustable rubber-shod feet for adjusting level of Table. Each Table is supplied complete with the following Accesories: **Set of 3 guaranteed turned composition 1½ in. Billiard Balls, two 4 ft. Cues, large Marking Board, fitted with brass runners and pointers, Chalk and Book of Rules.**

OVERALL SIZE: 5 ft. 4 in. x 2 ft. 9 ins. **Also supplied finished in beautiful Mahogany colour—same price.**

DELIVERED ON FIRST OF 6 MONTHLY PAYMENTS OF **9/-**

Smaller Sizes in Stained Oak or Mahogany

Size of table	Length of cues	Diam. of balls	
4 ft.	3 ft. 6 in.	1⅜ in.	**35/-**
*3 ft. 6 in.	3 ft.	1¼ in.	**23/6**
*3 ft.	3 ft.	1⅛ in.	**19/6**

**The last two tables have slightly cheaper quality cloth.*

'GAMAGE' SNOOKER SETS

In view of the vastly increased popularity of Snooker, we strongly recommend the purchase of a Snooker Set with any of our Billiard Tables. **5 ft. Table, with 17 Ball Snooker Set, £3 6s., or 6 Monthly Payments of 12/-.**

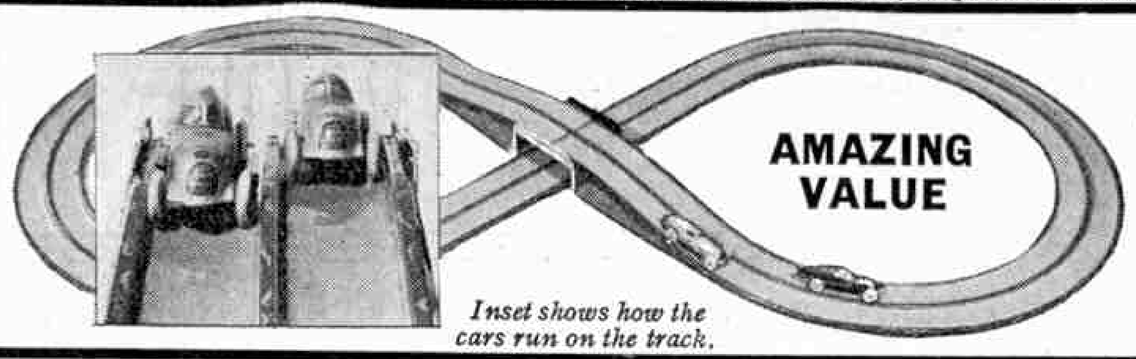
Carriage Paid on Billiard Tables to Nearest Railway Station, England and Wales.

THE FAMOUS "SCHUCO-STUDIO" CAR

Undoubtedly the cleverest mechanical toy ever put on the market. The ingenious, steerable, driving-school car with differential gear! Driving, steering and parking exercises may be carried out. Wheels and tyres can be changed; detachable steering wheel. Winding by crank lever or by friction wheel put under pressure on a backward movement.

No. 1 Set (Assembled Car), 3/6.
Set No. 2 comprises chassis, four wheels, tyres, steering lever, hubs, spanners, roller lifting jack and full instructions for assembly.

5/-



Inset shows how the cars run on the track.

THE FAMOUS 'GAMAGE' SPEEDWAY

For Speed and Thrills! A special purchase of 10,000 of these wonderful toys enables us to offer them at a much lower price than ever before; in fact last Christmas they were 12/6. The entire track when assembled measures 57" long by 25½" wide. Each section is firmly fixed together by special clips. The two Cars each measuring 4" long are fitted with Brakes, and two keys are included. With one winding the Cars race round the Track, up the hill, across the bridge, and down, speeding round the track again under the bridge, lapping the track 7 to 8 times.

5/11
Post 6d.

Note. 3 or 4 Cars can be used and extra cars (each with brake) cost only **9d.** each.

GAMAGES, HOLBORN, LONDON, E.C. 1

Telephone: HOLborn 8484

This model won the "WAKEFIELD CUP"

Build one for yourself!

Wing Area 196 sq. ins.
Total Weight 4¾ ozs.

PRICE
30/-

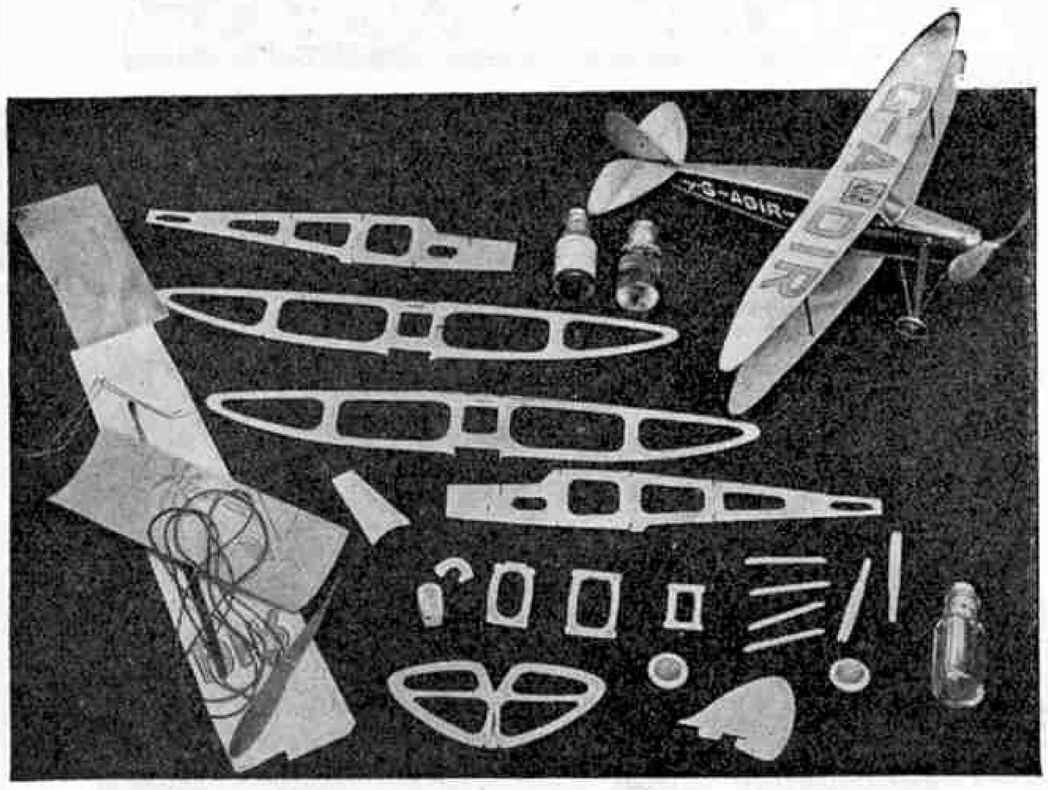
To the enthusiastic model builder this kit provides the opportunity for constructing a machine capable of long duration flights. All the Balsa Wood parts are **CUT OUT** and a carved airscrew with free wheel mechanism and tensioner device is provided. All wire parts are bent to shape and soldered where necessary. The outfit includes all dope, glue, etc., and full sized working drawings. International Model Aircraft Ltd. have purchased the exclusive world rights of this model and are making the kits under the personal supervision of Mr. Judge, the designer-pilot of the Wakefield Cup winner.

DURING CONTEST IT FLEW OVER 8 MINUTES

FROG TRADE MARK REGD.

Three scale model CONSTRUCTION KITS

NO TOOLS REQUIRED. ALL PARTS CUT TO SHAPE



These construction kits enable the enthusiast to build his own Flying Scale Models. They are easy to build and no tools are required. All parts are blanked out and fit together perfectly, only needing to be glued. (This is supplied.) Wire parts are already bent to shape. No paint is required, all coverings are printed in the correct colours. Supplied complete with motor lubricant and spare motor.

De Havilland "LEOPARD MOTH" 2/6
Wing Span 12¼ ins. Length 9½ ins.

De Havilland "HORNET MOTH" 3/6
Wing Span 11 ins. Length 9½ ins.

Hawker "DEMON" 2-seater fighter 4/6
Wing Span 12¼ ins. Length 11 ins.

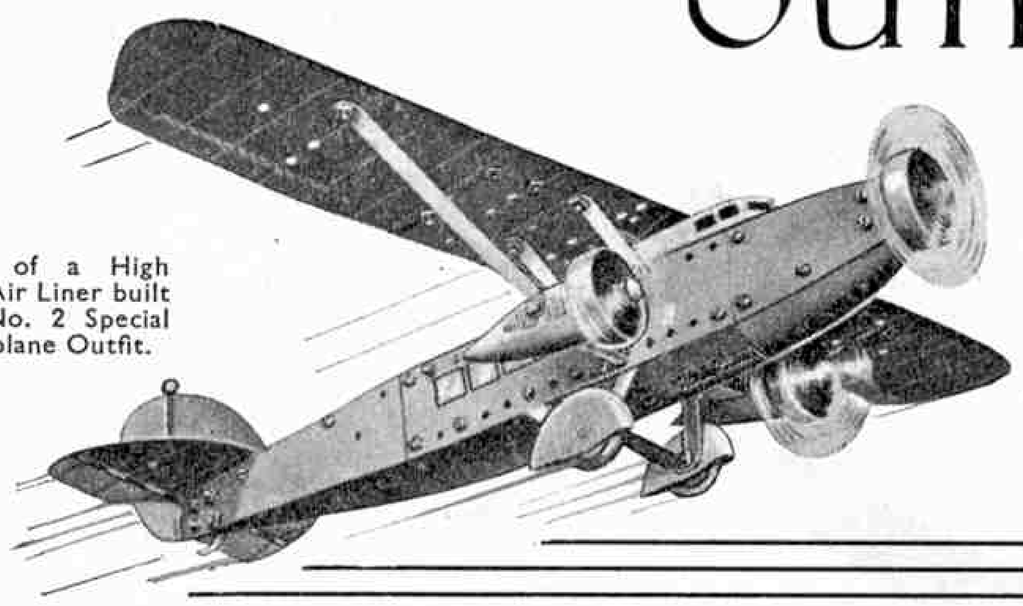
FROG MODEL AIRCRAFT

All FROG model aircraft are covered by World Patents granted and pending. Made in England by International Model Aircraft Ltd.

Sole concessionaires:

LINES BROS. LTD., Tri-ang Works, Morden Rd., London, S.W.19

AEROPLANE CONSTRUCTOR OUTFITS



Model of a High Wing Air Liner built with No. 2 Special Aeroplane Outfit.

Boys! Build these splendid model aeroplanes

Every boy should know how aeroplanes are designed and constructed, and should be able to recognise the different types of machines at a glance. These fine Constructor Outfits contain a range of aeroplane parts by means of which boys are able to design and build their own Aeroplanes quite easily.

The Illustrated Manual of Instructions included in each Outfit shows how to build wonderful models of high and low wing Monoplanes, Biplanes, Seaplanes and many other interesting types.

No. 2 Aeroplane Constructor Outfit.

No. 2 Special Aeroplane Outfit.

PRICE LIST

STANDARD SERIES

No. OO AEROPLANE OUTFIT

This excellent new Outfit contains a good selection of Aeroplane Parts, with which realistic models of aeroplanes can be built. Price **3/3**

No. O AEROPLANE OUTFIT

An interesting range of models can be built with this Outfit, including high and low wing monoplanes. Price **4/6**

No. 1 AEROPLANE OUTFIT

Magnificent models of high and low wing monoplanes, and interesting model biplanes can be built with this fine Outfit. Price **7/6**

Aeroplane Constructor Accessory Outfit No. 1a, costing 6/–, will convert a No. 1 Outfit into a No. 2.

No. 2 AEROPLANE OUTFIT

The parts contained in this Outfit make possible a splendid range of models, including triple-engined monoplanes and biplanes and a racing seaplane. Price **12/6**

SPECIAL AEROPLANE OUTFITS

The Special Aeroplane Constructor Outfits have been designed with great care and thought to make possible the building of more realistic models of the latest types of aircraft. Each Outfit is available in two different colour combinations.

SPECIAL SERIES

No. 1 SPECIAL AEROPLANE OUTFIT

The parts in this Super Aeroplane Outfit will build over 20 realistic models of different types of aircraft. Price **12/6**

A No. 1a Special Aeroplane Accessory Outfit, Price 10/–, will convert a No. 1 Special Aeroplane Constructor Outfit into a No. 2 Special.

No. 2 SPECIAL AEROPLANE OUTFIT

This is the finest Aeroplane Constructor Outfit on the market. It contains a big range of aircraft parts, with which numerous models of practically any type of machine may be built—44 examples are shown in the Manual of Instructions that is included. Price **21/–**

All the Aeroplane Outfits are available in two different colour combinations—Red and Cream and Blue and White.

No. 1 AERO CLOCKWORK MOTOR

This long-running Motor fits into the fuselage of models made with No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfits. It will rotate the propeller at high speed. Price **1/9**

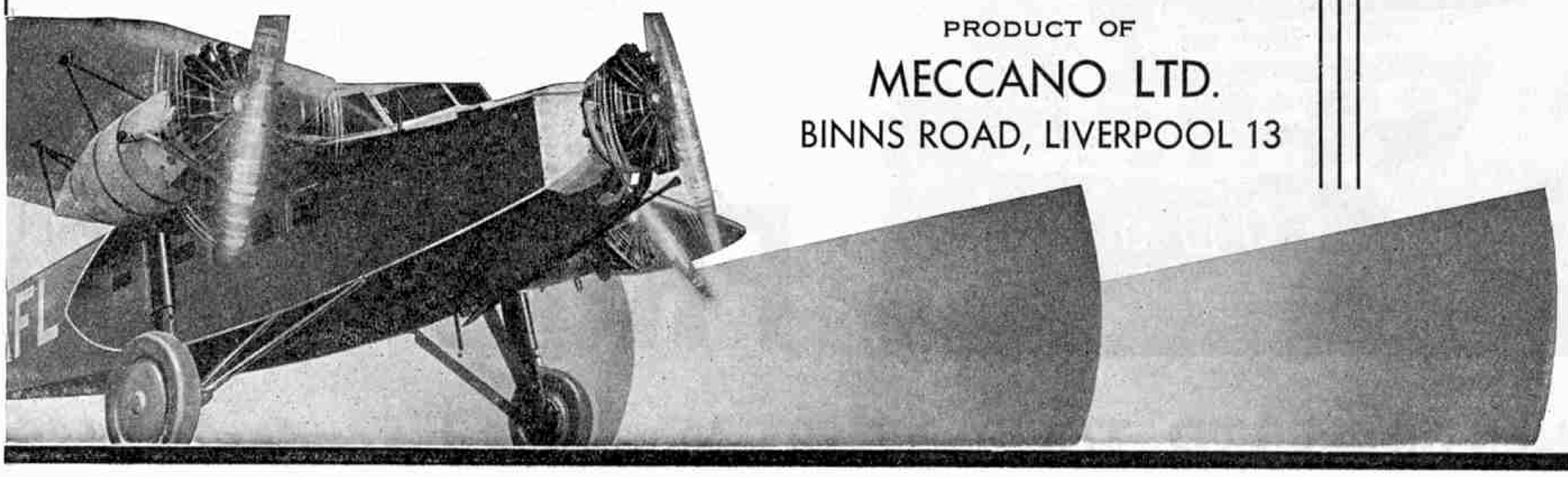
No. 2 AERO CLOCKWORK MOTOR

In addition to rotating the propeller this powerful motor also drives the landing wheels of No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfit models, making the machines taxi along the floor in a most realistic manner. Price **3/6**

PRODUCT OF

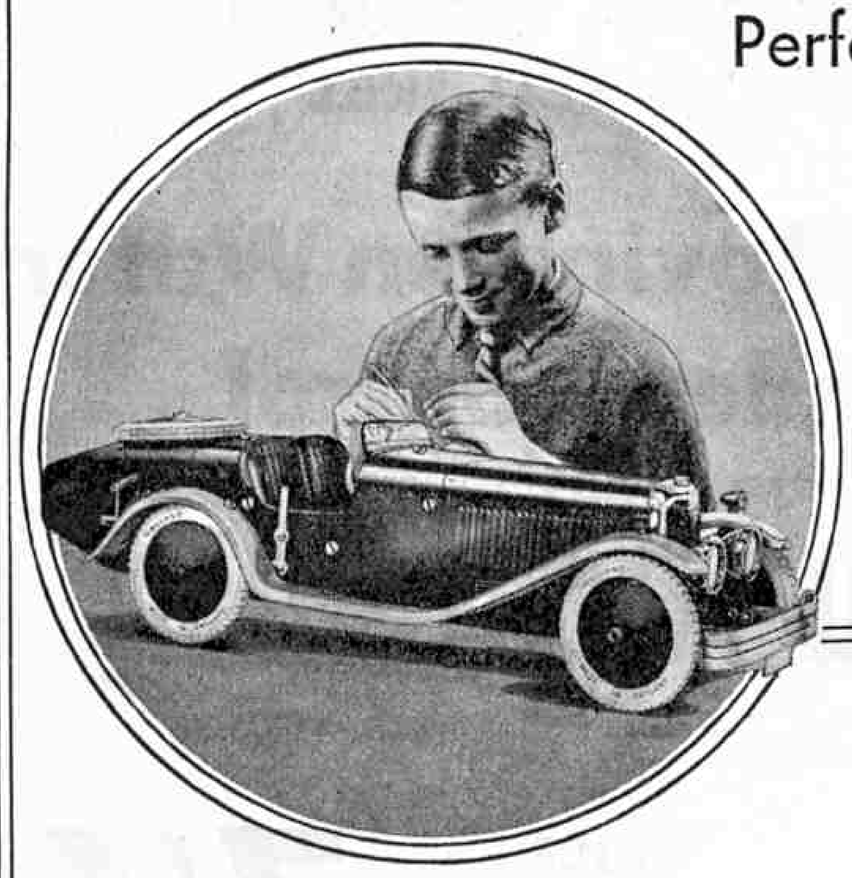
MECCANO LTD.

BINNS ROAD, LIVERPOOL 13



MOTOR CAR CONSTRUCTOR OUTFITS

Perfect Miniature Motor Cars!



MOTOR CAR LIGHTING SET

With this Lighting Set the headlamps of Motor Car models built with the No. 2 Motor Car Outfit can be electrically lighted. Price **2/6**

The Lighting Set contains everything necessary for equipping No. 2 Motor Car models with electric lighting, excepting a dry battery. This should be of the 3-volt type, size 1½" x 2½" x ⅞", and can be obtained from any dealer in electrical supplies.

MOTOR CAR GARAGE

The Meccano Motor Car Garage provides accommodation for any Meccano model Motor Car or other car of suitable size. It is strongly built, with imitation rough-cast finish. Inside dimensions: Height 5". Length 13". Width 7¾". Price **5/6**

No. 2 Motor Car Constructor Outfit.

Every model-building enthusiast will be keen to have one of these fine Motor Car Constructor Outfits. Sports four-seaters, coupés, speed cars, and other perfect miniature reproductions of many different types of cars can be built with the special parts contained in them. All the models are driven by means of a powerful Clockwork Motor (included in the Outfit), giving a long, speedy and realistic run on each winding.

The motor car parts are finished in rich enamel, nickel-plate and chromium, the complete Outfits being masterpieces of miniature automobile craftsmanship.

No. 1 Motor Car Constructor Outfit.

No. 1 MOTOR CAR OUTFIT

The motor car models that can be built with this Outfit are perfect examples of miniature automobile construction. Think of the fine fun you could have building these wonderful models, each one of which faithfully resembles its prototype.

No. 1 Outfit is supplied with the parts finished in a delightful colour combination of red and light blue.

A powerful and long running Clockwork Motor is included.

Price **10/–**

No. 2 MOTOR CAR OUTFIT

Larger models of a superior type can be built with No. 2 Motor Car Outfit. They are all perfectly designed, beautifully finished, and the most attractive examples of constructional engineering ever produced.

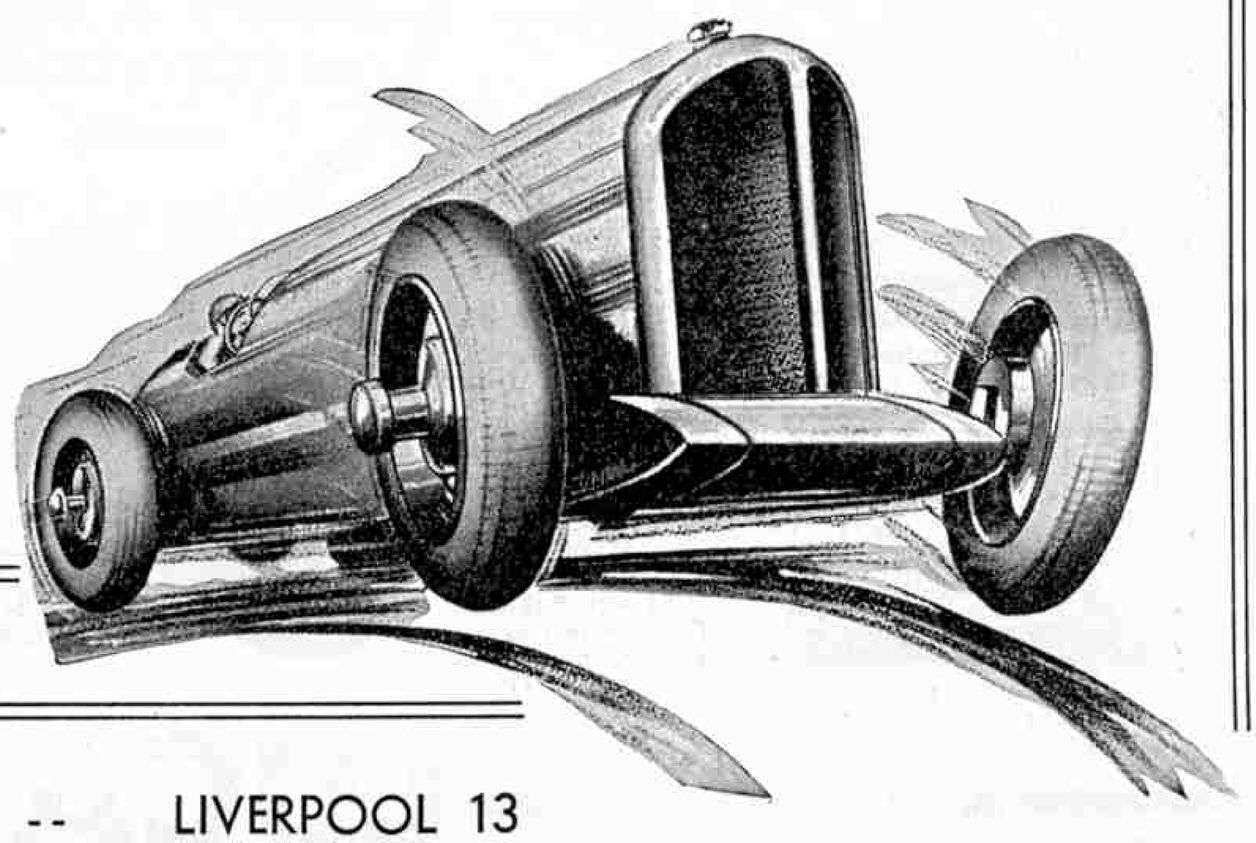
The parts in this Outfit are richly finished in red and light blue, a combination that gives a charming effect to the completed models.

A powerful Clockwork Motor giving a run of 150 feet on one winding is included in the Outfit.

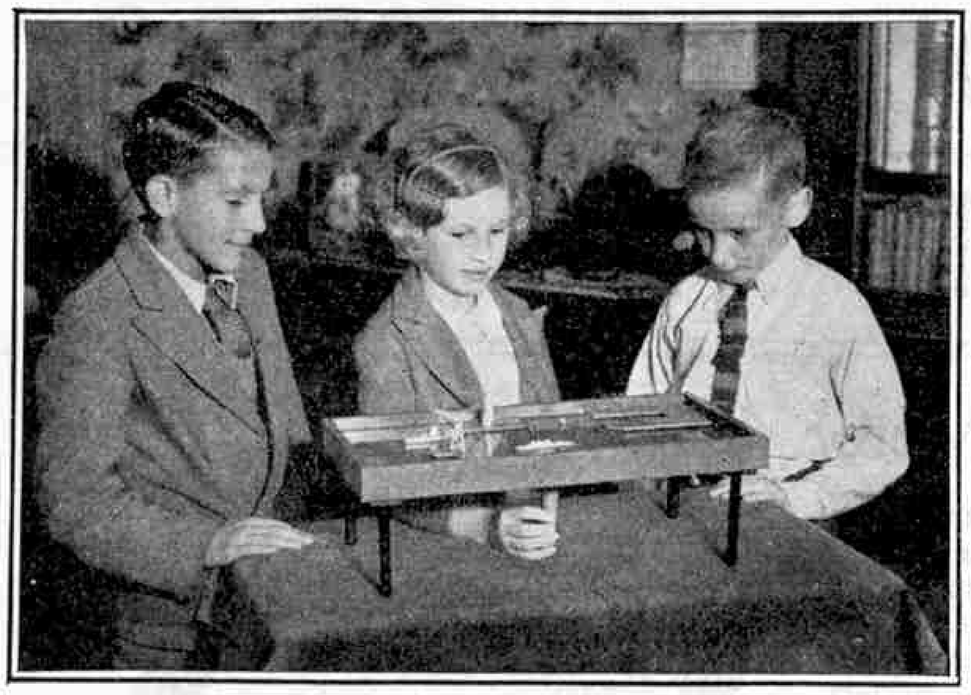
Price **20/–**

Built-up models of any of the Motor Cars that can be made with No. 2 Outfit are available. Price **20/–**

IMPORTANT.—It should be noted that the No. 1 Motor Car Outfit parts cannot be used in conjunction with those of the No. 2 Outfit.



PRODUCT OF
MECCANO LTD. -- BINNS ROAD -- LIVERPOOL 13



SET IS COMPLETE WITH R.M.S. "QUEEN MARY"—COASTAL STEAMER—TUG—MODEL HARBOUR—HARBOUR LIGHTS—BUILDINGS and MAGNETIC CONTROL BAR.

Most Sensational Toy of the Year

INTERESTING — FASCINATING
FULL OF REAL SKILL

Ships Moving on Water Under Control

Docking R.M.S. "Queen Mary"

A Warneford Series

Prov. Patent No. 16225-36

FROM GOOD STORES AND TOY SHOPS EVERYWHERE

Sole Manufacturers:

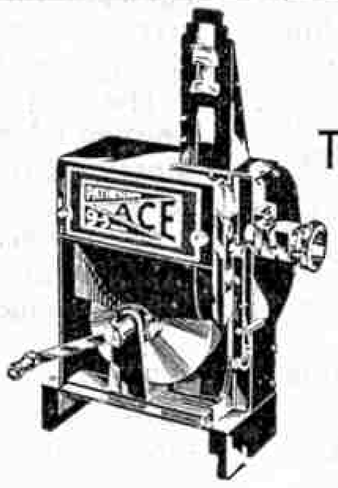
WARNEFORD FLYING AIRCRAFT, Greenwich Road, London, S.E.10

PRICE COMPLETE 7/6

HOBBIES
for
THE WINTER EVENINGS

We specialise in hobbies for boys and here recommend a few of the various ways of spending a pleasant and profitable evening.

Fretwork Sets
Of the best quality, British made, from **1/-**



Pathe Ace Cinema
The perfect gift for a winter evening, **37/6** (other makes from **12/6**)

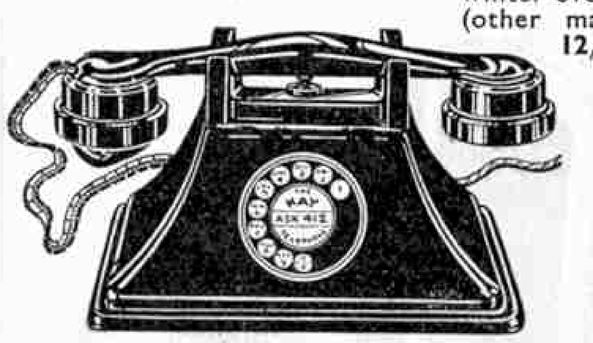


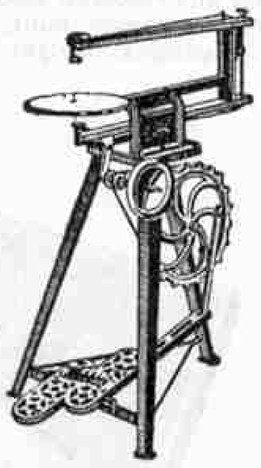
Table Telephones
Beautifully finished in Bakelite, **25/-**

Carpentry Sets
The ideal kit to have in the home, from **3/-**

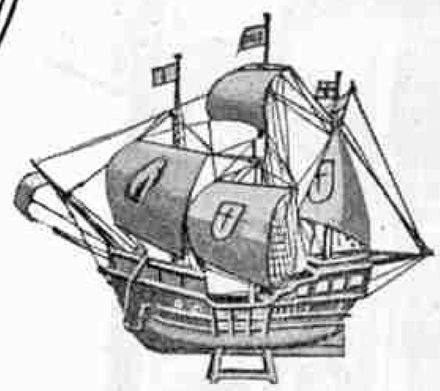
Street Robots
Fitted with a battery and coloured bulbs, from **2/11**

Steam Engines
Of superior quality and efficiency, from **10/6**

Conjuring Sets
A source of wonderment and amusement, from **3/6**

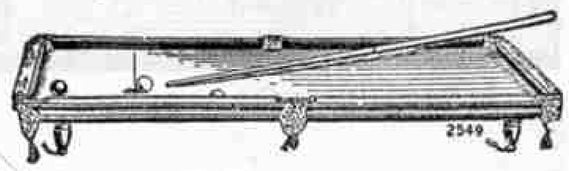


Fretwork Machines
The machine with **101** uses, from **30/-**



Galleon Kits
Complete set of parts for building, from **12/6**

Chemistry Sets
Lott's ... ... from **2/-**
Kemex ... ... „ **5/-**

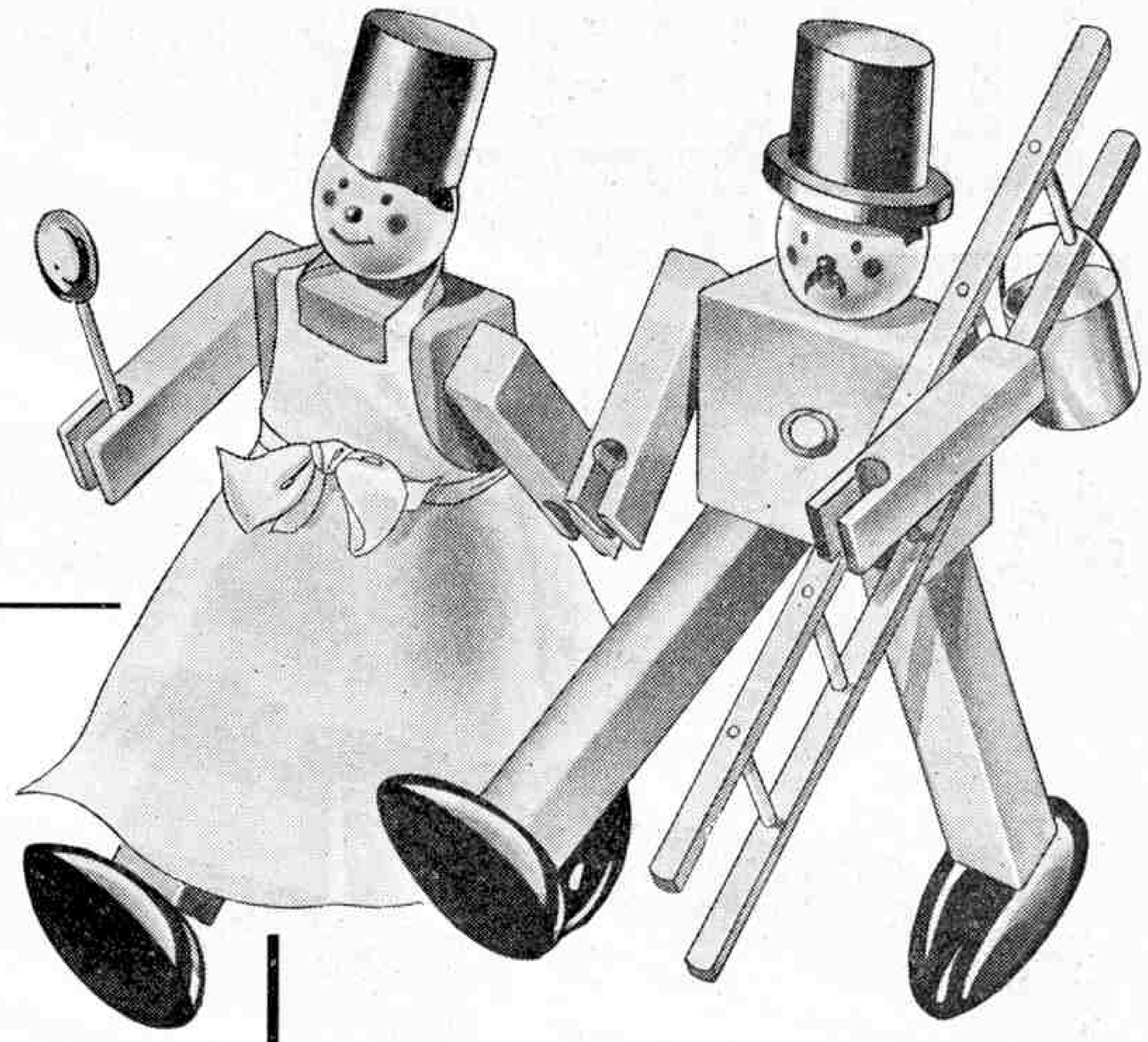


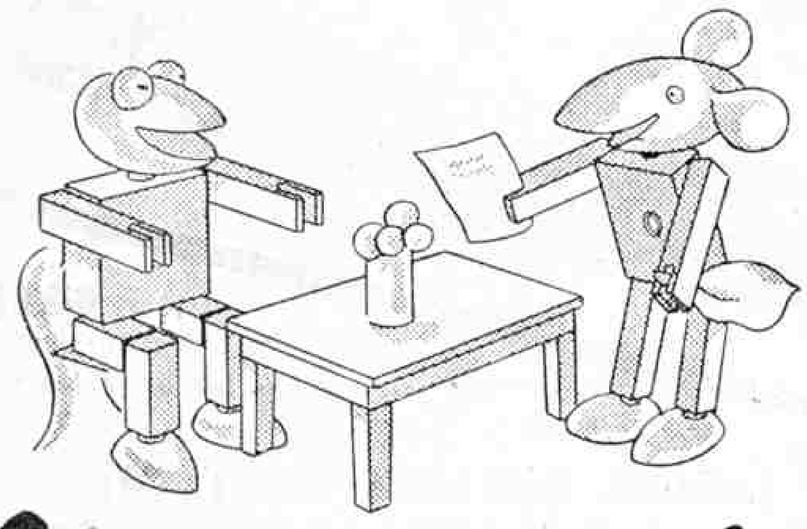
Billiard Tables
The most amazing value ever offered at the price, 4 ft. long, **15/6**

WRITE FOR FREE LISTS

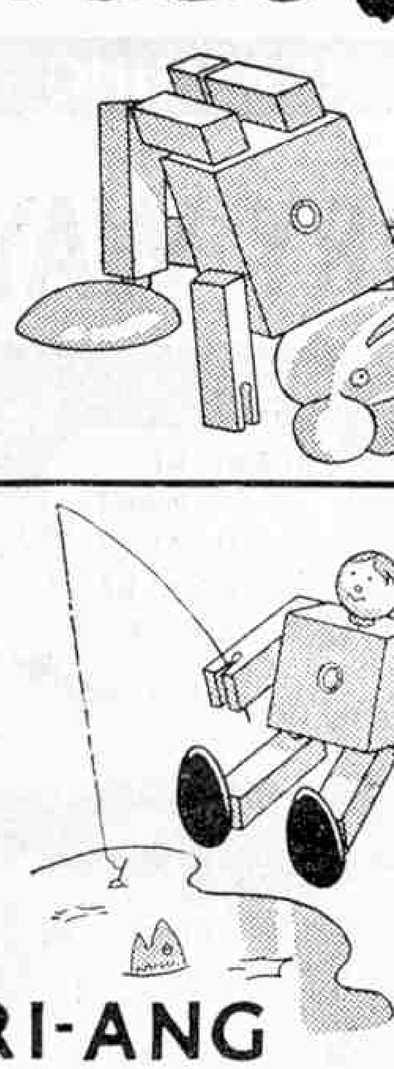
LUCAS'S

The Boys' Arcadia - 17, HOUGHTON STREET, CLAYTON SQUARE, LIVERPOOL 1 - *Hobbies Depot*





Meet the Fit-Bit Kids

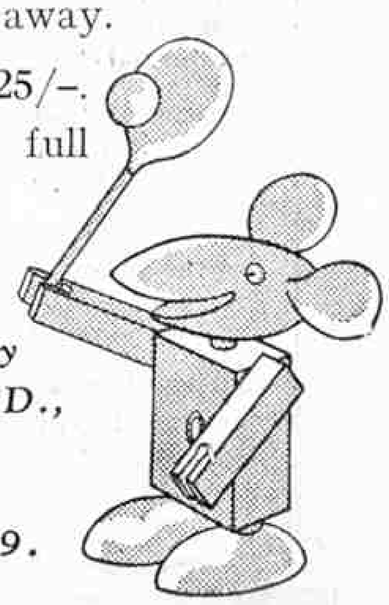


CONSTRUCTION TOYS WITH A DIFFERENCE

Fit-Bits are the latest thing in toys. These jolly figures come all to pieces, and you put them together again in whatever form you like. There's no end to the different combinations: human figures, animals, ships, table decorations, etc. They are all beautifully coloured, and are fitted with patented rubber connections which make the figures flexible and lifelike.

The results depend on your powers of imagination and ingenuity. But Fit-Bits are always amusing—a lasting source of fun and instruction. Start collecting them right away.

Complete sets from 1/11 to 25/–. Ask your toy shop for full particulars.



TRI-ANG

FIT-BITS

PATENT PENDING IN MOST COUNTRIES

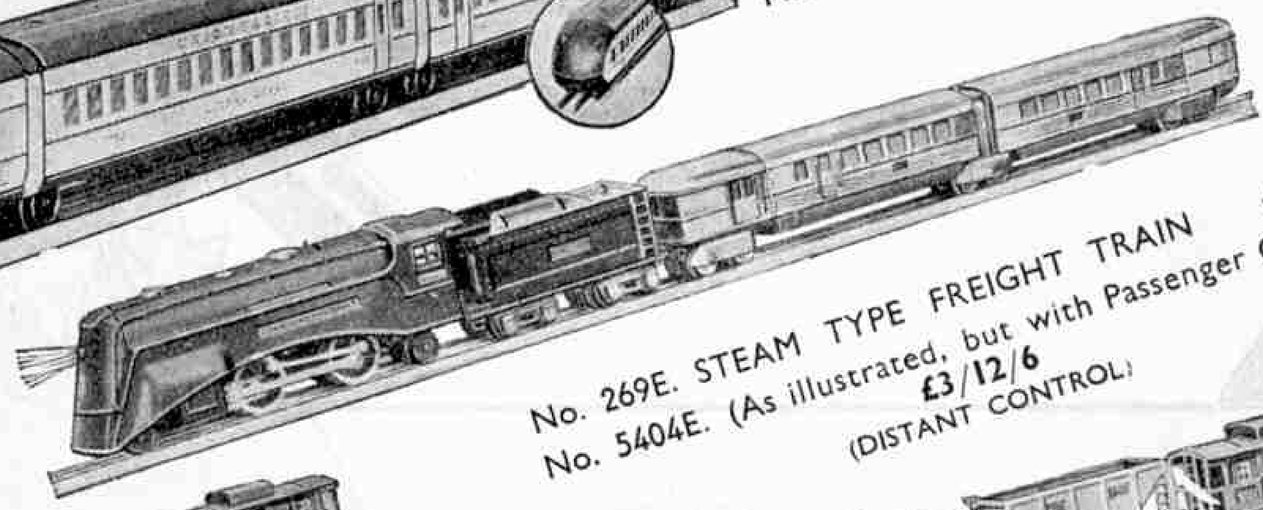
TRADE MARK

Made in England by
LINES BROS. LTD.,
Tri-ang Works,
Morden Road,
LONDON, S.W.19.

LIONEL ELECTRIC TRAINS "ARE WONDERFUL" SAY PROUD OWNERS

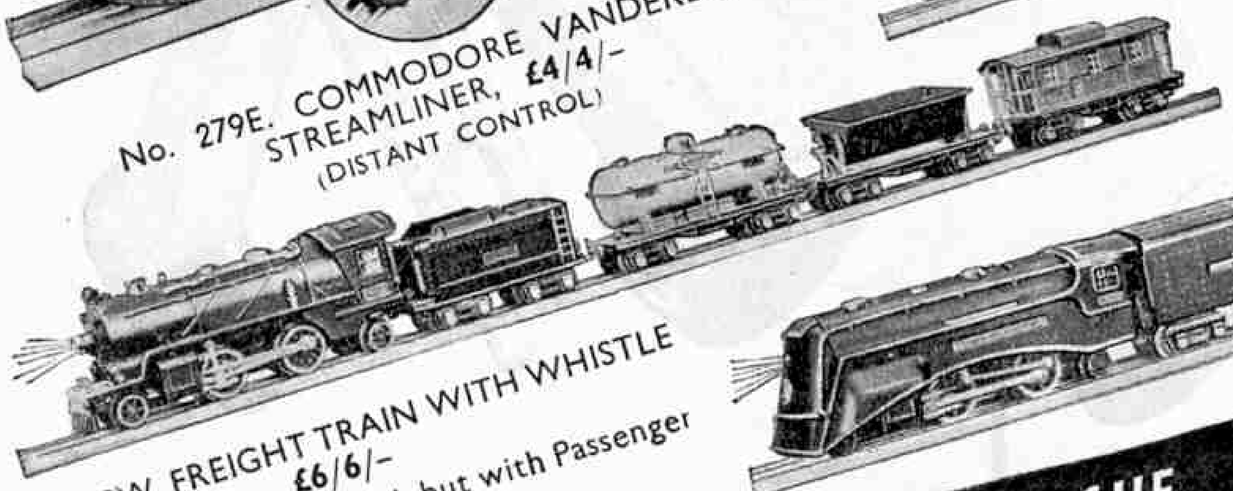
MADE IN U.S.A.

No. 751W. UNION PACIFIC STREAMLINER WITH WHISTLE, £7/7/-
No. 751E. WITHOUT WHISTLE, £6/6/-
(DISTANT CONTROL)



No. 269E. STEAM TYPE FREIGHT TRAIN £3/12/6
No. 5404E. (As illustrated, but with Passenger Coaches) £3/12/6
(DISTANT CONTROL)

No. 279E. COMMODORE VANDERBILT STREAMLINER, £4/4/-
(DISTANT CONTROL)



No. 273W. FREIGHT TRAIN WITH WHISTLE £6/6/-
No. 274W. (As illustrated, but with Passenger Coaches), £6/6/-
(DISTANT CONTROL)

IT IS **FREE** TO YOU ON REQUEST.
(Please give name of favourite dealer.)
SEND CARD TO:

LIONEL SERVICE DEPT. (9)
35/6, ALDERMANBURY, LONDON, E.C.2

Catalogue shows complete range from 32/- and gives comprehensive details of all Trains and particulars of introduction of realistic Railroad Whistle.

THE 1936/7 CATALOGUE IS NOW READY

STRONG MUSCLES · DEEP CHESTS · HEALTHY DEVELOPMENT · DEEP BREATHING ·

IT'S FUN KEEPING FIT THE TERRY WAY

NO MORE WINTER COLDS IF THEY DO THESE EXERCISES

Exercises 25, 26, 27, 28
For developing shoulders, triceps, forearm and chest.

Exercise 38 and 39
For great forearm strength and lung power.

Exercise 29 and 30
For biceps, triceps and back muscles.

Exercise 31 and 32
For biceps, triceps, neck and chest muscles.

YOUNG folk who use the wonderful Terry "Steelstrand" Expander grow big, strong and healthy. You can **see** the improvement daily. There's no way so marvellous as the Terry way, and with each Expander you get a Free Book of simple exercises showing how to strengthen every part of the body. Great fun they are, too. Really enjoyable

Single strand models from **3/6** to **6/6**. Extra strands to add as you grow stronger, **2/3** to **4/-**.

Give the Children

TERRYS

Steelstrand

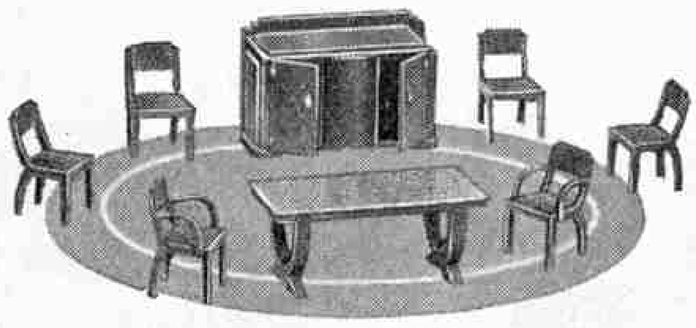
EXPANDER

HERBERT TERRY & SONS LIMITED, REDDITCH.

Dinky Toys

DOLL'S HOUSE FURNITURE

A WONDERFUL SERIES OF ACTUAL SCALE MODELS

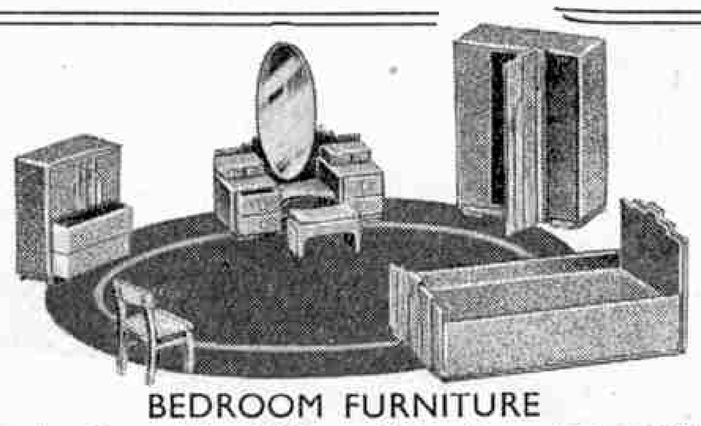


DINING-ROOM FURNITURE

Dinky Toys No. 101 Price of complete set 2/3

No. 101a.	Table	5d. each
No. 101b.	Sideboard (Opening doors)	9d. ,,
No. 101c.	Carver Chairs	3d. ,,
No. 101d.	Chairs	2d. ,,

Supplied in walnut brown finish only.

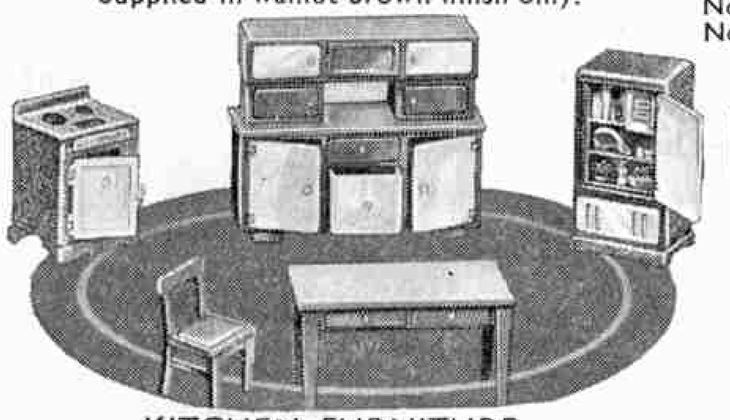


BEDROOM FURNITURE

Dinky Toys No. 102 Price of complete set 2/11

No. 102a.	Bed	6d. each
No. 102b.	Wardrobe (Opening door) ...	9d. ,,
No. 102c.	Dressing Table (Opening drawers)	10d. ,,
No. 102d.	Dressing Chest (Opening drawers)	6d. ,,
No. 102e.	Dressing Table Stool	2d. ,,
No. 102f.	Chair	2d. ,,

Supplied in colour or walnut brown finish.

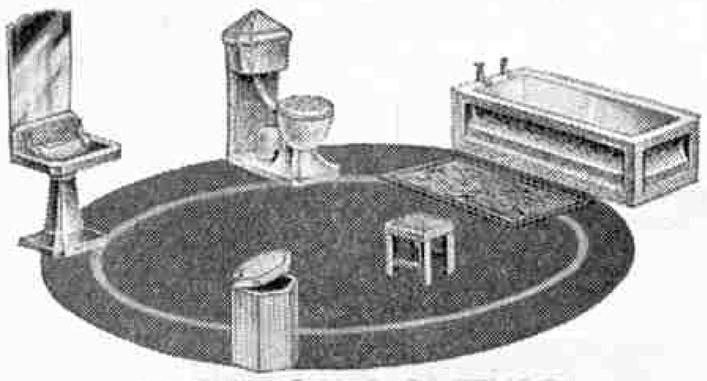


KITCHEN FURNITURE

Dinky Toys No. 103 Price of complete set 2/6

No. 103a.	Refrigerator (Opening Door)	8d. each
No. 103b.	Kitchen Cabinet (Opening doors and drawer) ...	10d. ,,
No. 103c.	Electric Cooker (Opening door)	6d. ,,
No. 103d.	Table	4d. ,,
No. 103e.	Chair	2d. ,,

Supplied in two colour schemes—light blue and white; light green and cream.



BATHROOM FURNITURE

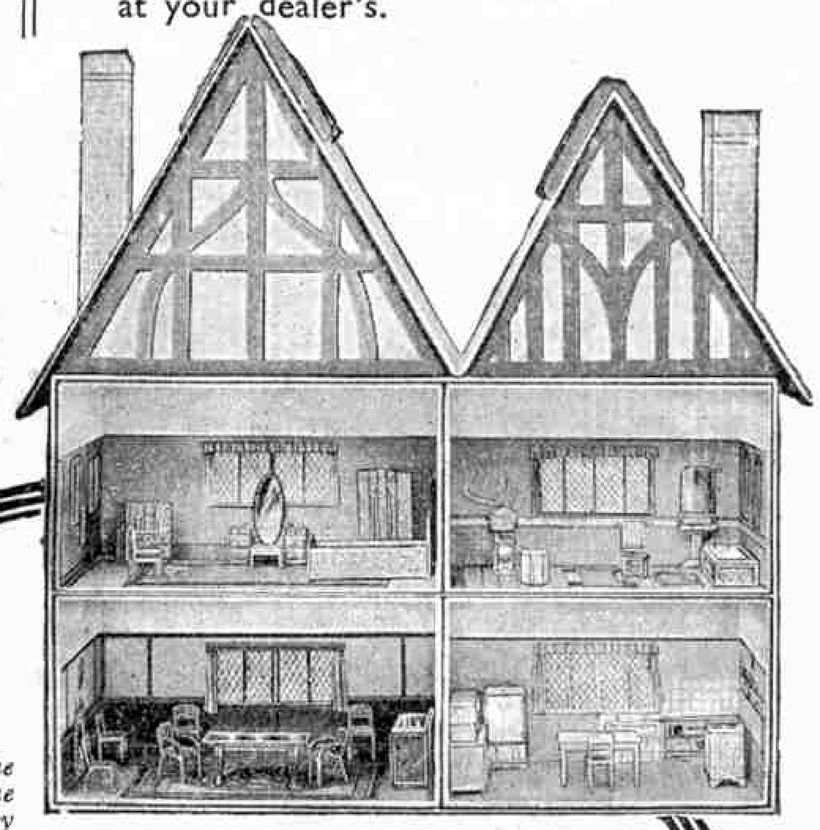
Dinky Toys No. 104 Price of complete set 2/–

No. 104a.	Bath 6d. each	No. 104b.	Bath Mat 1d. each
No. 104c.	Pedestal Hand Basin		6d. ,,
No. 104d.	Stool		2d. ,,
No. 104e.	Linen Basket (Opening lid) ...		4d. each
No. 104f.	Toilet (Lifting lid)		6d. each

Supplied in two colour schemes—pink and white; light green and white.

The extension of the range of Dinky Toys to include true-to-scale modern Furniture will be welcomed by all who know the charm of these perfect miniatures. Much care and thought have been given to the design, finish and presentation of every article of this Furniture series. Each piece is based on a typical example of modern design, and **all are actual scale models made to a scale of 7/16th of an inch to one foot.** There is a tone and individuality of style about Dinky Toys Doll's House Furniture which cannot fail to appeal. Among the most attractive features are the opening doors and drawers. This furniture is far superior to anything of its kind that has ever before been produced for the delight and pleasure of young people.

See the display of Dinky Toys Furniture at your dealer's.



This back view of the Doll's House shows the four suites of Dinky Toys Doll's House Furniture tastefully arranged in position.

"DOLLY VARDEN" DOLL'S HOUSE

FOR DINKY TOYS FURNITURE

The "Dolly Varden" Doll's House illustrated here has been specially designed for use with Dinky Toys Doll's House Furniture.

The house is collapsible and the exterior is designed to represent a half-timbered dwelling, while the interior decorations, which are printed in nine colours, are in an attractive modern style.

Reinforced leather board is the material of which the house is constructed, and when set up it is as strong as a wood structure. The container, which also is made of reinforced leather board, opens out to show a lovely garden with Tennis Lawn, Carriage Drive, and Rockery, providing an exquisite setting for play with Dinky Toys and Hornby Trees, Hedging, etc. Price 9/6

DIMENSIONS

The following are the overall dimensions of the "Dolly Varden" Doll's House when built up ready for play. Length, 1 ft. 6¾ in. Depth, 10¼ in. Height, 1 ft. 6¾ in.

The open container on which the house stands measures 3 ft. 3½ in. by 2 ft. 5½ in.

When the house is dismantled and packed in container, the overall dimensions of the complete parcel are ¾ in. x 1 ft. 7½ in. x 2 ft. 5½ in.

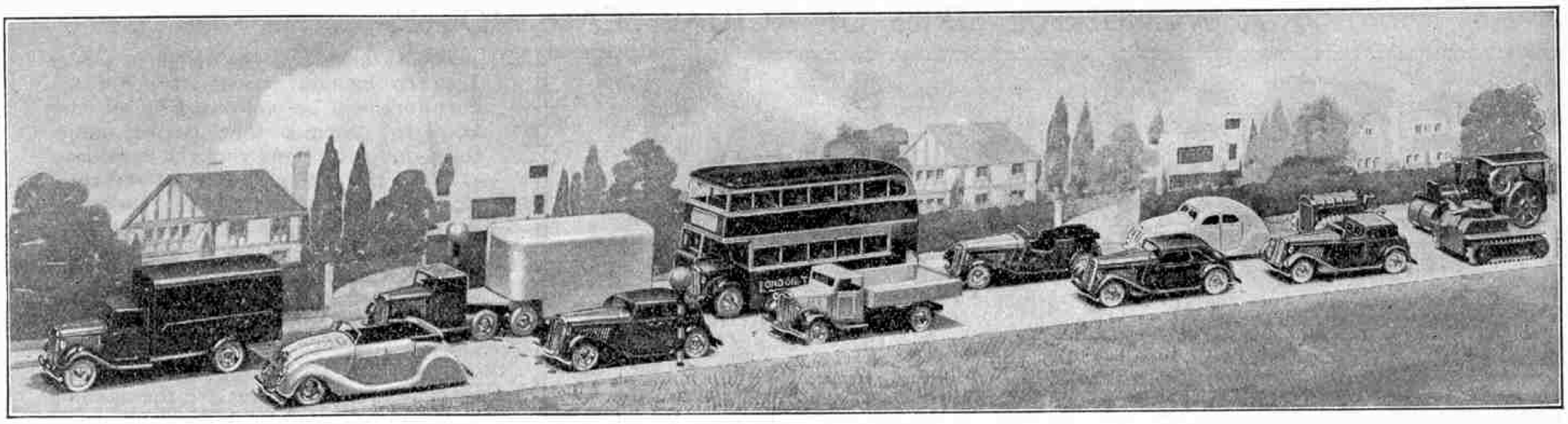
The Couch Hammock, Tennis Net, Garden Seats, Dinky Toys Garage, Motor Cars and Figures, and the Hornby Trees and Hedging featured in the illustration on the left are not included with the Doll's House and Garden.

MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

MINIC

Regd. Trade Mark

ALL TO SCALE CLOCKWORK TOYS

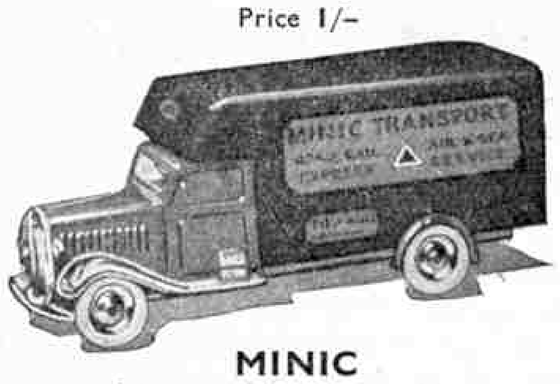


LOOKS LIKE A REAL ROAD DOESN'T IT?

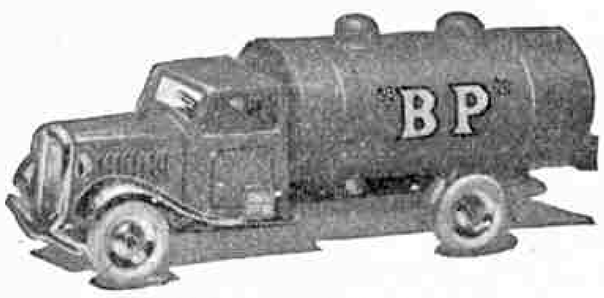
Almost every type of road vehicle represented; **some with electric lights.** Strongly constructed, fitted with powerful, long-running mechanism, and disc wheels, with rubber tyres, they will run anywhere, **even on the carpet.** Each model is beautifully finished in a variety of colours, and packed singly in an attractive box.

MINIC Ford £100 Saloon
LENGTH 3½ ins.
Price **6d.**

MINIC Racing Car
LENGTH 5½ ins.
Price **1/–**

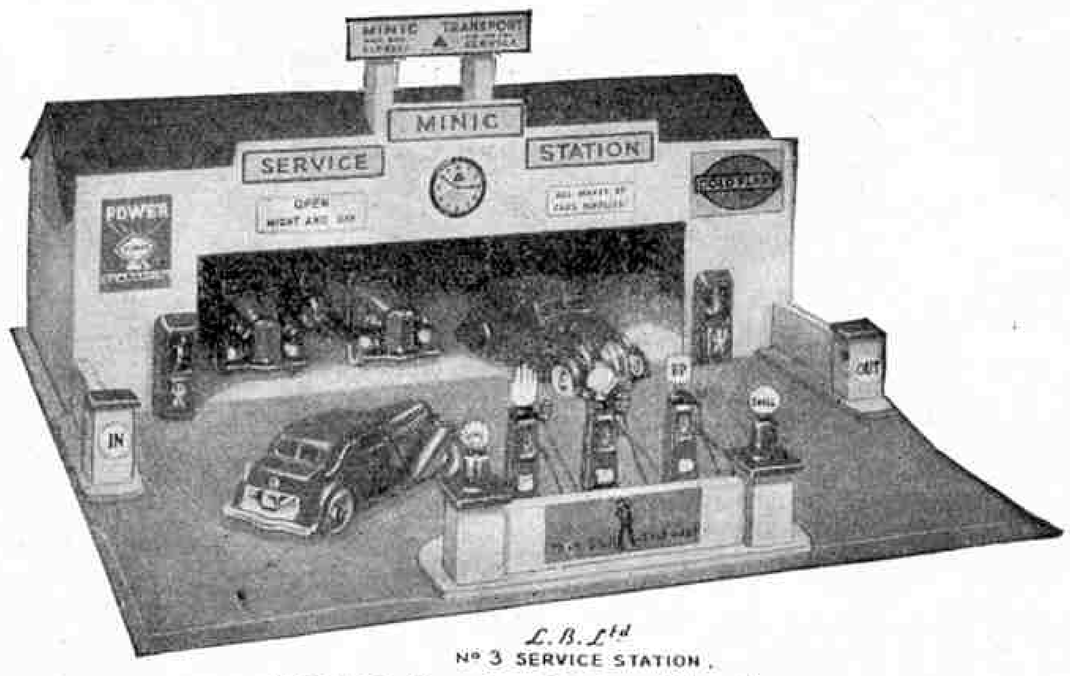


MINIC
Luton Transport Van
LENGTH 5½ ins.
Price **1/6**



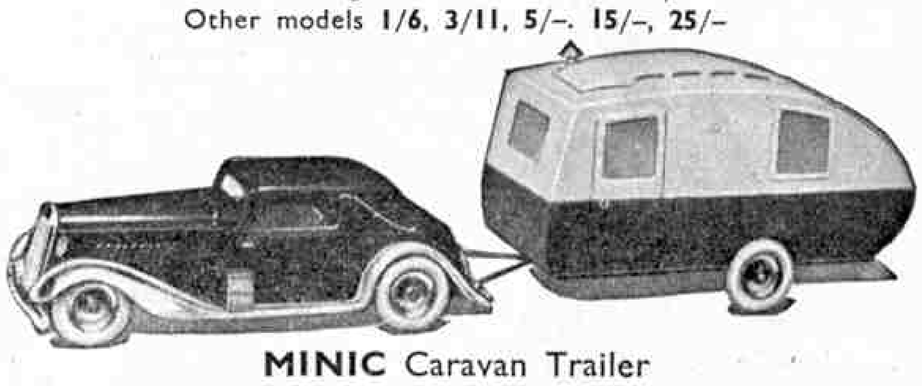
MINIC Petrol Tank Lorry
LENGTH 5⅞ ins.
Price **1/–**

MINIC
Mechanical Horse and Trailer with cases
LENGTH 7⅜ ins.
Price **2/6**

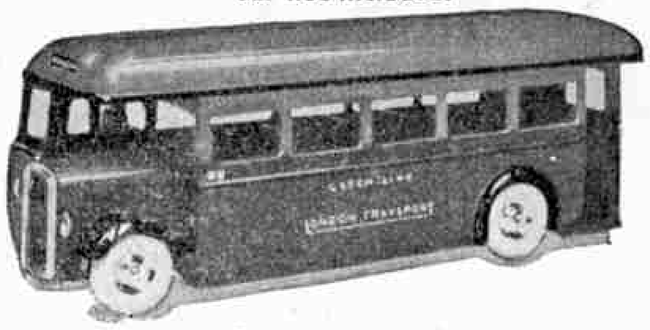


L.B.Ltd
No 3 SERVICE STATION.

MINIC Service Station No. 3
Realistic design, imitation red tiled roof with sign, three large petrol pumps, one large oil cabinet, two electric lights and battery, dummy clock face and other signs. LENGTH 16 ins. **7/6**
Other models **1/6, 3/11, 5/–. 15/–, 25/–**

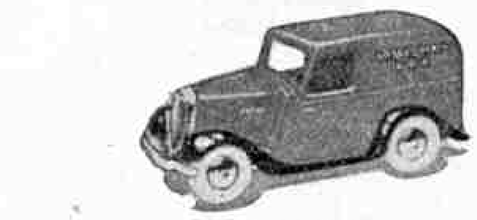


MINIC Caravan Trailer
LENGTH 4¼ ins.
With electric light and battery. Price **3/6**
Car not included.

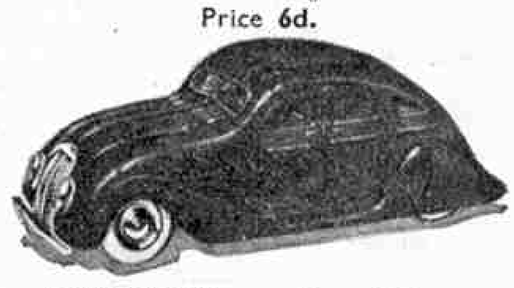


MINIC Single Deck Bus
LENGTH 7¼ ins.
Price **3/6.** Red or green.

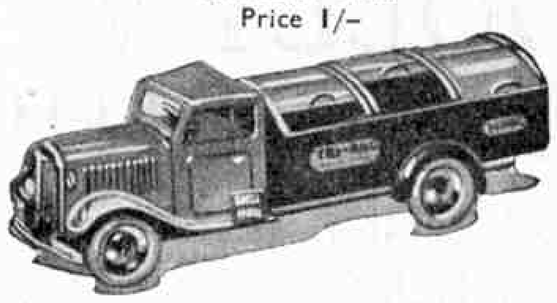
TRI-ANG TOYS
OBTAINABLE AT ALL GOOD TOY SHOPS AND STORES



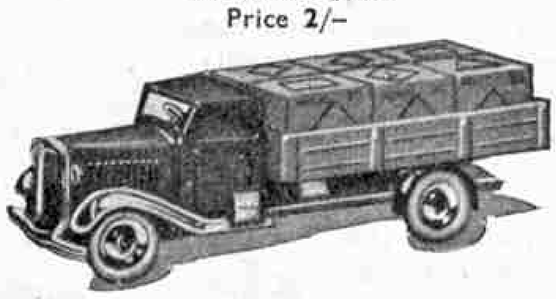
MINIC
Ford Royal Mail Van
LENGTH 3⅜ ins.
Price **6d.**



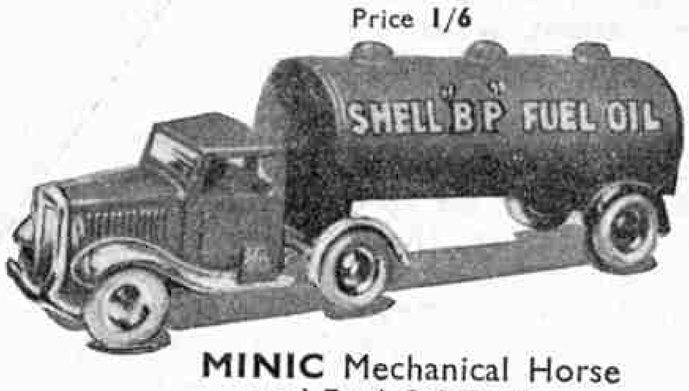
MINIC Streamline Saloon
LENGTH 5 ins.
Price **1/–**



MINIC Dust Cart
LENGTH 5½ ins.
Price **2/–**



MINIC Lorry with cases
LENGTH 5½ ins.
Price **1/6**



MINIC Mechanical Horse and Fuel Oil Trailer
LENGTH 7 ins.
Price **2/–**

PRICES DO NOT APPLY IN I.F.S.

Made in England by LINES BROS. LTD., TRI-ANG WORKS, MORDEN ROAD, LONDON, S.W.19

NEXT MONTH: SPECIALLY ENLARGED CHRISTMAS ISSUE. PUBLISHED 1st DECEMBER

MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXI. No. 11
November, 1936

With the Editor

Mr. Frank Hornby

I find it difficult to express adequately my feelings in regard to the death of Mr. Frank Hornby. The severing of a close association extending over a great number of years comes as a great shock, and it takes time to adjust oneself to the new circumstances resulting from the loss of a strong personality. I feel that I cannot do better here than quote the following gracious tribute from Emeritus Professor H. S. Hele-Shaw, D.Sc., LL.D., D.Eng., M.Inst.C.E., F.R.S., Past President of the Institution of Mechanical Engineers. It was to this famous engineer that Mr. Hornby first submitted his invention, and his quick appreciation of the unlimited possibilities of this constructional toy gave help and encouragement at a time when it was badly needed.

Dr. Hele-Shaw writes: "It is always a sad thing, although alas! it often happens, that when a man has reached success, even beyond his wildest dreams, the hand of death deprives him of a well-earned, happy and peaceful old age. Such is the case of the late Mr. Frank Hornby.

"It must be well over 40 years ago that I first met him, when I was Professor of Engineering at the Liverpool University. I am not sure if I was actually the first to whom he appealed for help from his little workshop below stairs, where I think there was a small lathe and a few tools, and where he began a work which has brought not merely enjoyment to young and old, but, to the young especially, something beyond mere amusement—the laying of the foundations of sound principles in mechanics which has been of incalculable service to the world.

"I forget what I wrote about Mr. Hornby's work and ambition, but he told me, when he proudly showed me round the Meccano Works during the visit of the Institution of Mechanical Engineers in 1934, that he had been able to borrow £5 as a result of my letter; and with a twinkle in his eye, assured me it had been promptly paid back again!

A Trade given to this Country

"It is with no little pride that his fellow workers can look upon the trade that 'Meccano' and Hornby trains have given to this country—namely, mechanical toys, which trade had before been largely in the hands of foreign countries. Although these countries had a long start, it is owing to him, and in later years to the help which he received from many able men, that Meccano and the name of Hornby are universally recognized as in advance of anything previously achieved in model-making,

"It was a great triumph for Mr. Hornby when the American Courts decided that his work, although not perhaps protected by impregnable patents, was of such national importance as to secure the protection of the American Government in the face of powerfully organized imitation.

"These few remarks have been written at short notice in appreciation of a man whose brave and uphill work to establish a great industry will never be forgotten. It is safe to say that the work of Frank Hornby, and the name 'Meccano' associated with his name, is secure for all time on the Roll of Fame."

A Message to all Readers

The news of the death of my father, Frank Hornby, has been received in all quarters, and especially in that great and wonderful country called Meccanoland, with the deepest regret, and I wish to thank very sincerely all those who have written to express their sympathy.

As the inventor of Meccano, and the head of the Meccano Guild and the Hornby Railway Company, the great organisations founded by him, he came into close and affectionate contact with the youth of the whole civilised world. The responsibility of maintaining this contact falls upon me as his elder son and the first Meccano boy, and I accept this responsibility as a great and sacred trust. I look back to the days when my father first began to see dimly the outlines of his great invention; and I recall vividly the wonderful evening when I helped him to cut out from a sheet of copper the very first Meccano parts.

I send my cordial wishes to readers of the "Meccano Magazine," to members of the Meccano Guild and of the Hornby Railway Company, to all Meccano boys, and to all to whom my father's invention and its developments have brought pleasure. I assure them that I shall do my utmost to further their interests and to carry on the high traditions associated with the name of Frank Hornby.

Yours very sincerely,

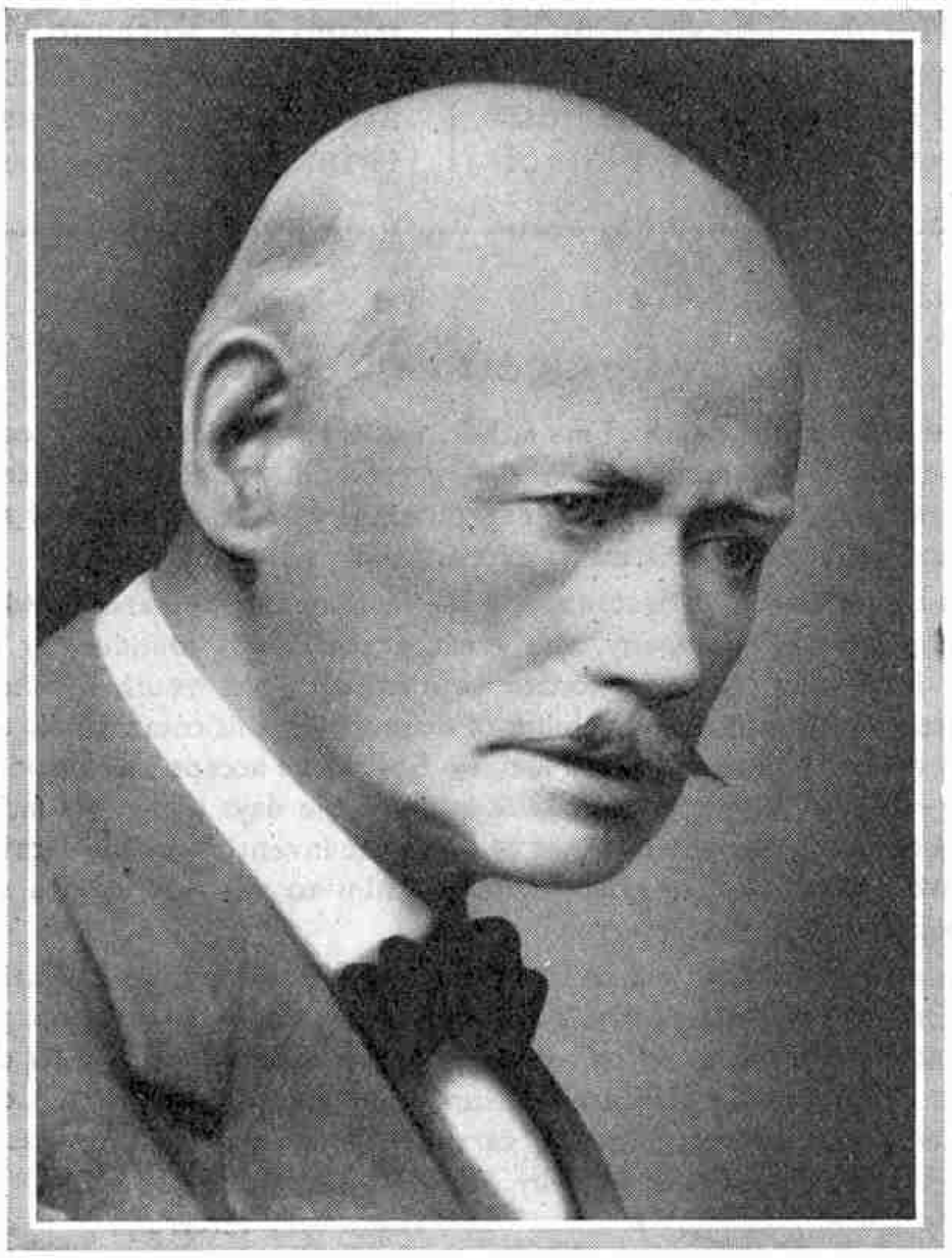
Roland F. Hornby.

Frank Hornby

Inventor of the World's Most Famous Toy

MECCANO, like all other inventions that time has proved to be of real worth, did not emerge complete as the result of a sudden inspiration, but developed slowly as an idea, at first crude and dimly outlined, grew more and more sharply defined.

Frank Hornby was born in Liverpool. From his early boyhood he was interested in mechanical matters, and later, when to his great joy he became the owner of a little workshop of his own, his happiest hours were spent in making devices of his own contrivance. About this time he came across the famous book "*Self-Help*," by Samuel Smiles, in which are described the difficulties encountered by various inventors, and the way in which these were overcome. These stories appealed to young Hornby's imagination and fired him with the ambition to become an inventor. His first effort in this direction was a bold one—nothing else than the invention of a perpetual motion machine! Not knowing that he was attempting the impossible, he worked away at one scheme after another. Finally, of course, he had to admit defeat, but his time had not been wasted, for he had greatly improved his mechanical knowledge and skill. Turning now to simpler matters he produced various small inventions, all interesting, but of no practical value; there was always some flaw in each one that made it useless. For instance, he spent a great deal of time on a submarine that was to submerge and rise automatically. When it was tried out it submerged beautifully, but by no means could it be persuaded to come to the surface of its own accord!



Frank Hornby.

Frank Hornby commenced work in an office, and in due course rose to be chief managing clerk of a Liverpool firm of importers. He never abandoned his mechanical pursuits, however, and as the years passed by he gradually acquired a useful equipment of tools and a good all-round knowledge of engineering principles and methods. As his two sons grew up he delighted in making toys for them, but found it difficult to meet their continual demands for new ones. The trouble was that for every new toy new parts had to be made, because most of the parts of previous toys were useless for any but their original purpose. While casting about for some way of reducing this waste of time and material he happened to notice a large crane in operation. As he watched it he was struck by the essential simplicity of its construction, and the idea occurred to him that a model of it could be built with a comparatively small number of easily-made parts. Eagerly following up this idea, he gradually thought out a scheme of perforated parts that could be bolted together in any required positions, and afterwards could be unbolted and reassembled in different arrangements.

Full of enthusiasm for his new idea, Frank Hornby bought a large sheet of copper and a pair of shears, and hurried home to experiment with a series of perforated strips. Mr. Roland G. Hornby, his elder son, has often described to the writer the excitement that prevailed on that and many subsequent evenings, as he helped his father to prepare his parts. The strips were all cut to a width of half an inch, their lengths being $2\frac{1}{2}$ in., $5\frac{1}{2}$ in., and $12\frac{1}{2}$ in. respectively; and they were perforated with equal-sized holes at half-inch intervals, this being the special task of the son, who thus became in a real sense the very first Meccano boy.

Suitable rods and bolts were obtained from a watchmaker, but although Frank Hornby sought high and low he could not obtain nuts of the correct size, and therefore was obliged to make these himself. Angle brackets for fastening the strips together at right-angles were cut out of sheet copper. Wheels provided the next problem, for none of suitable size and construction could be bought; so the inventor had to work out his own design and have the wheels cast for him in a local brass foundry and then turned in the lathe. The next difficulty was to devise a suitable method of fixing the wheels on the rods. The usual collar and setscrew would of course have been satisfactory, but at the time this method seemed to him to be too expensive for his requirements, and he adopted a steel clip for the purpose. Subsequently he abandoned the clip in favour of the setscrew.

It was a long and weary time before all the parts were ready for trying out, but he was encouraged by the growing certainty that he was working along right lines. At last came the great day when he built up the first Meccano model, a crane, which ran on wheels and luffed and jibbed in the same manner as a real crane. It may be imagined what delight Frank Hornby and his sons took in building the crane, taking it to pieces, and building it up again! Before they attached the jib, the base of the crane looked so much like a truck that they added a few more strips and made it into a real truck that could run on rails formed of strips. Then it was found that the parts could be used to construct a whole range of other models.

The next step was to consult a patent agent and to obtain the necessary protection for the great idea. An English patent was granted in January 1901, and foreign patents followed in due course.

In later years Frank Hornby often said that he wondered if he would ever have tackled the task of developing his invention if he had foreseen the trouble and difficulties he was destined to encounter. At first matters seemed hopeless. He approached one firm after another with a view to their manufacturing and marketing the toy, but without success. He then had the happy idea of submitting photographs and details of the toy to Professor Hele-Shaw, who at that time was Professor of Engineering at the Walker Engineering Laboratories, University College, Liverpool. In his reply Professor Hele-Shaw expressed the opinion that the scheme was based on sound engineering principles, and that it should have great success as a constructional toy. This letter was of great assistance to the inventor in enabling him to obtain the financial assistance necessary to have the parts manufactured for him.

The toy, to which he gave the name "*Mechanics Made Easy*," was now actually in being, but troubles came thick and fast. The parts were made by different manufacturers, and it was impossible to ensure uniformity of finish, or to rely on all of them being ready at the same time. Soon it became clear that the only satisfactory course was to produce all the parts in one factory, and so Frank Hornby took the step of transforming himself from an inventor into a manufacturer.

The first "factory" was so crude that it seems marvellous that anything was ever produced in it at all. It consisted of a single room, equipped with a few hand presses, a lathe or two, and a small gas engine which, as the result of a vast amount of humouring, was persuaded to produce the necessary power. The actual making of the parts with this crude machinery provided plenty of excitement, but this was nothing to the thrills of cleaning the finished wheels and other brass parts. When these came from the presses they were dirty and tarnished, and in order to give them a bright finish they were first dipped in strong acid to clean them, and afterwards lacquered to prevent further tarnishing. Frank Hornby and his chief assistant used to stay behind in the one-roomed factory after the other employees had gone home, and bring out the acid vats to dip the wheels. There was no proper system of ventilation, with the result that the fumes from the acid often became choking. When matters got too bad, both men had to dash out into the open air to recover!

It was about this time that the name "*Mechanics Made Easy*" was changed to the handier and shorter one of "*Meccano*." This name was registered in England on 14th September 1907, and ever since has been the mark of the genuine Hornby system.

This first factory soon proved utterly inadequate, and a move was made to larger premises. Frank Hornby has told us that the size of these premises terrified him, and that he never thought he would fill them. As he put it, the building seemed more suitable for building locomotives than for making the small Meccano parts! In spite of these forebodings, however, the demand for Meccano increased so rapidly that not only was the building crammed with machinery, but also it became evident that in a very short time still larger premises would be required. Then Frank Hornby, looking to the future and now confident of success, took the bold step of buying a plot of land and building a factory for himself. So there came into being the great Meccano Factory in Binns Road, which is familiar by name to hundreds of thousands of boys all over the world. To the end of his life the factory was Frank Hornby's great pride, and he was delighted to welcome to it the thousands of Meccano boys who visit it every year.

Frank Hornby explaining the manufacture of Meccano Parts to the Duke of York, on the occasion of His Royal Highness' visit to the Meccano Factory in 1930.

The addition of Hornby Trains to the range of products of the Meccano factory is another romance of the toy trade. The idea originated in a little Meccano locomotive, and from this developed first the clockwork trains and later the electric trains which, with their accompanying range of track, rolling stock and accessories, have reached world-wide fame.

Most men would have been satisfied with these two phenomenal successes, but Frank Hornby's active brain was always searching for new ideas. The result was the rapid development of the many other Hornby products—constructional motor car and aeroplane outfits, chemical and electrical outfits, and the most fascinating of all miniatures, the famous "Dinky Toys." He never lost his enthusiasm and up to the time of his death was full of schemes for new products.

One of the greatest achievements of Frank Hornby's career was his success in welding together Meccano boys of all nationalities into the world-wide fellowship of the Meccano Guild. A few years later he founded the Hornby Railway Company, the purpose of which is to guide young railway enthusiasts along right lines in developing their miniature railways, and thus enable them to obtain the greatest enjoyment from their hobby. There can be no doubt that these two organisations have brought a vast amount of joy into the lives of thousands of boys.

Frank Hornby used to say that he believed he had a million boy friends; and one cannot help feeling that he was right.

Four Bridges In One

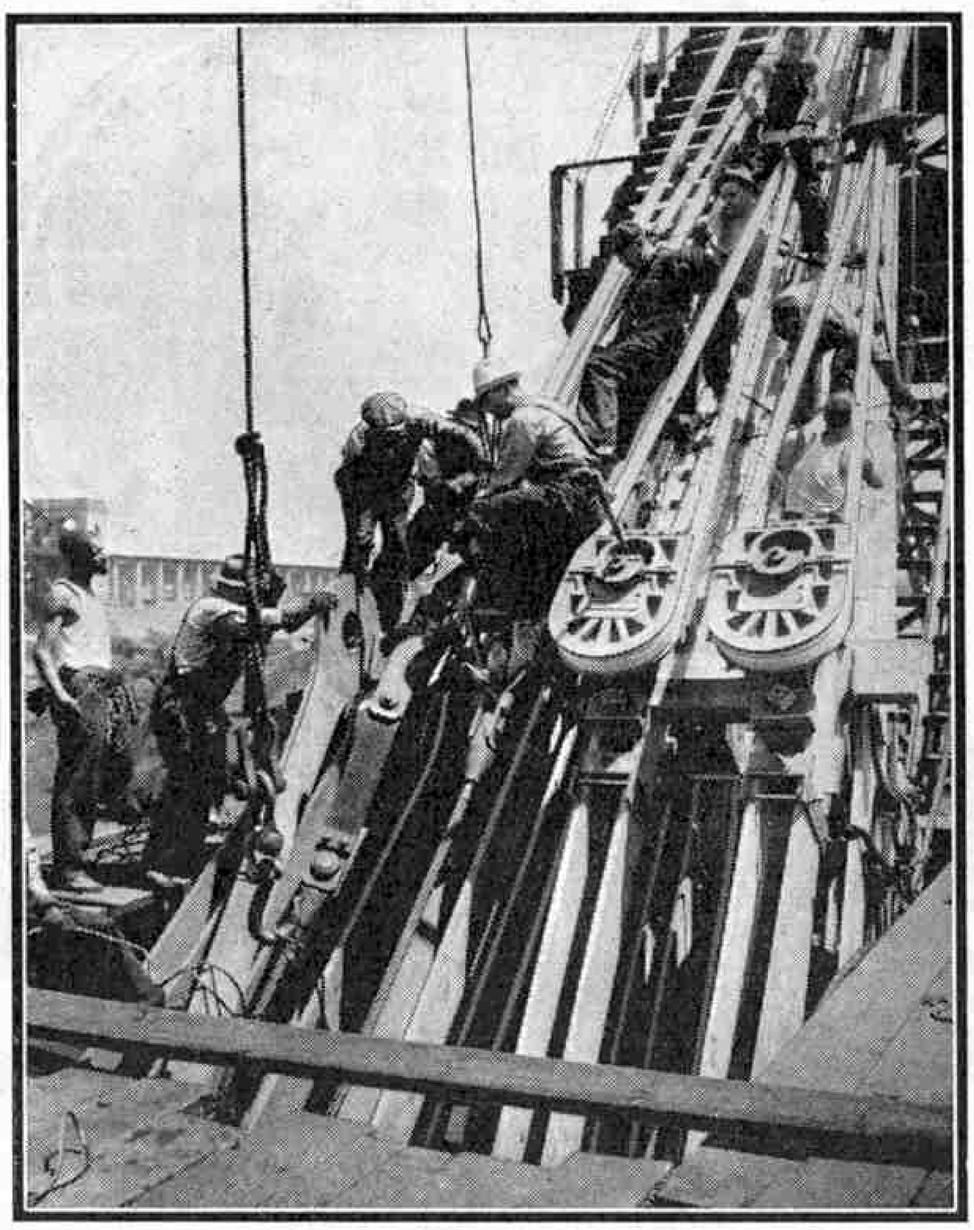
An Elevated Roadway Seventeen Miles Long

NEW YORK has grown with amazing rapidity since its foundation little more than 300 years ago. Then it was merely a settlement on Manhattan Island, which has a frontage to New York Harbour and is flanked on one side by the Hudson River and on the other by the East River. To-day it is the second largest city in the world. It covers the whole of Manhattan Island, and has spread across the East River, into Long Island where are the boroughs of Brooklyn and Queens, and also to the mainland, north of the Harlem River, where the Bronx is situated.

There is an enormous flow of traffic between the various sections of the city, and the waterways that have made it into a perfect seaport have proved serious obstacles to communication on land. As a result of this New York has become a city of bridges. On the west side the George Washington Bridge, the greatest suspension bridge in the world, connects Manhattan with New Jersey. The East River is spanned by three immense structures known as the Brooklyn, Manhattan and Williamsburg Bridges respectively, and also by Queensborough Bridge, which gives direct communication between Manhattan and Queens. There are also several small bridges across the Harlem River. These structures have proved inadequate, however, particularly for communication at the north end of Manhattan Island; and it has been found necessary to embark on a great scheme to improve matters on that side. The construction of a single bridge would not have solved the problem, and instead a great system of bridges and highways has been built across the junction of the East and Harlem Rivers to connect Manhattan, Queens and the Bronx. The structure is known as the Triborough Bridge because it joins these three boroughs.

There are two islands at the junction of the East and Harlem Rivers, where the three boroughs approach each other, and the engineers have made good use of them in working out their schemes. Four bridges have been erected over the adjoining waterways, one connecting the two islands and the others joining them to the three boroughs, and a viaduct unites the four bridges into a great highway. The entire structure is more than 17½ miles in length and includes 3½ miles of bridges. It has cost over £12,000,000, but this huge expenditure is justified by the use that will be made of it. Even in 1935 about 25,000,000 vehicles crossed between the boroughs, although the only direct connections were provided by ferries, and long detours had to be made to cross the existing bridges, all of which were overburdened with traffic.

The most outstanding structure is the suspension bridge over the East River. This section of the waterway has the picturesque name of Hell Gate, and the bridge across it has a main span of 1,380 ft. and is designed for a total load of nearly 11 tons for every foot of its length. The structure is wide enough to accommodate eight lines of traffic. Its deck is 135 ft. above water level, and is supported by two parallel suspension cables, each nearly two feet in diameter, which are slung between two steel towers 300 ft. high. Each tower consists of two columns connected by bracing, and rests on concrete foundations laid on bedrock and faced above ground with granite masonry. Twin anchorages are provided for the giant cables. These also are founded on rock and have a width of 150 ft. and a length of 225 ft.



Fastening the ends of one of the main cables of the East River suspension bridge. The illustrations to this article are reproduced by courtesy of The Chief Engineer, The Triborough Bridge Authority, New York.

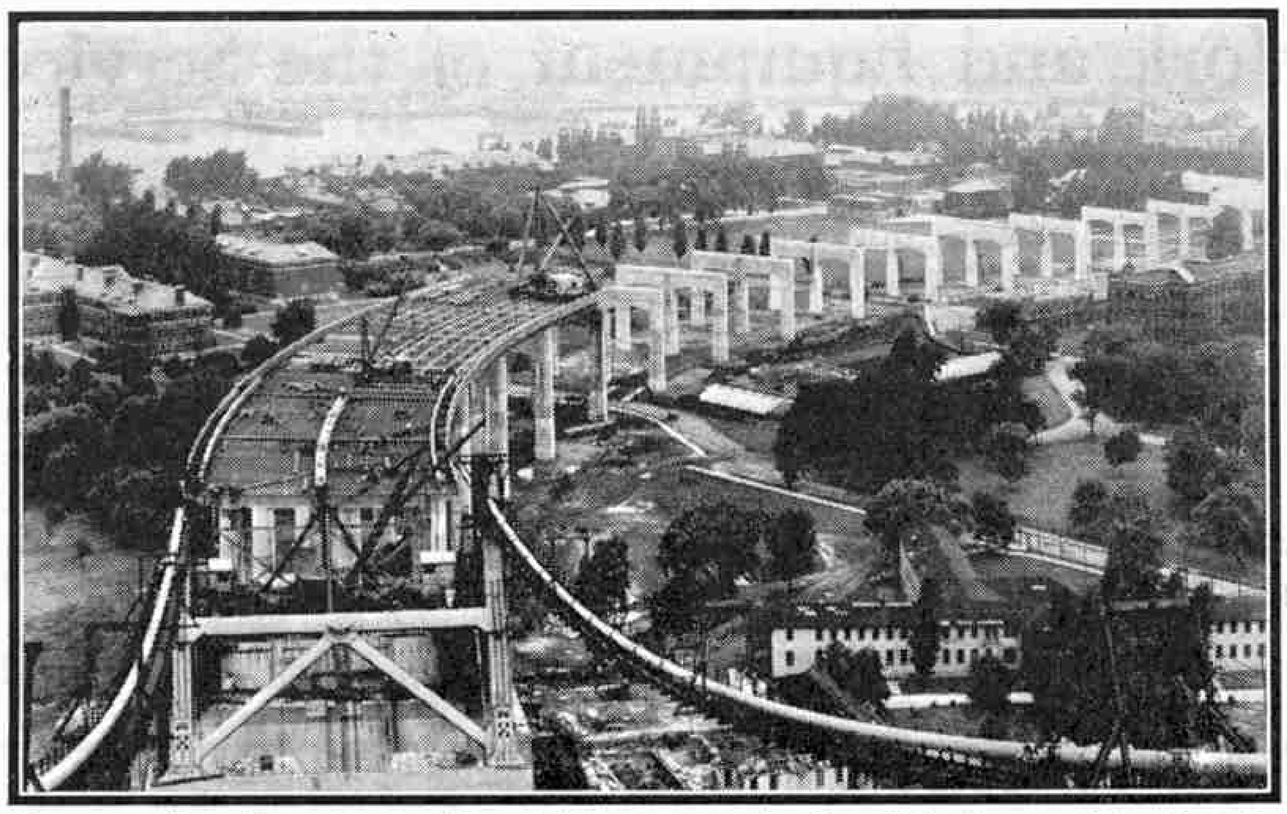
An interesting feature of the erection of the bridge was the manner in which the towers were built. That at the Queens end was built up to roadway level with the aid of a derrick supported on a temporary steel framework. The derrick then was dismantled and moved to the opposite bank of the river for use in erecting the lower part of the tower built there. In the meantime riveting proceeded on the Queens tower, and the men engaged in this task were not exposed to any danger from erection work carried on over their heads. Afterwards the derrick was returned to the Queens end for the erection of the upper part of the tower there, finally being used in completing the second tower, and throughout riveting and erection were never carried on together.

The wire cables were built up of single strands of cold-drawn galvanised steel wire, 0.196 in. in diameter, of high tensile strength. These wires were laid in groups or cores of 248 strands, and each cable consisted of 37 of these cores. This assembly of wires had a total cross sectional area of 277 sq. in. After spinning and adjustment in the saddles on the towers and at the anchorages hydraulic machines squeezed them together, the final diameter of each cable being 20¾ in. A temporary footbridge seven feet wide and suspended by ropes 2¼ in. in diameter was built for the use of the men engaged in this work.

The steel floor of the bridge was placed in position in

two stages in order to avoid excessive deflection of the cable due to unbalanced loading. The work was done by travelling cranes working from the towers. On the one hand these advanced toward the centre of the main span, and on the other toward the anchorages at the shore ends of the side spans. Thus as far as possible the increasing load was suspended from the cable symmetrically. Part of the steelwork was hoisted to the roadway level of the towers and placed in position during this stage of the proceedings and the remainder was erected as the travelling cranes made the return journeys to the towers.

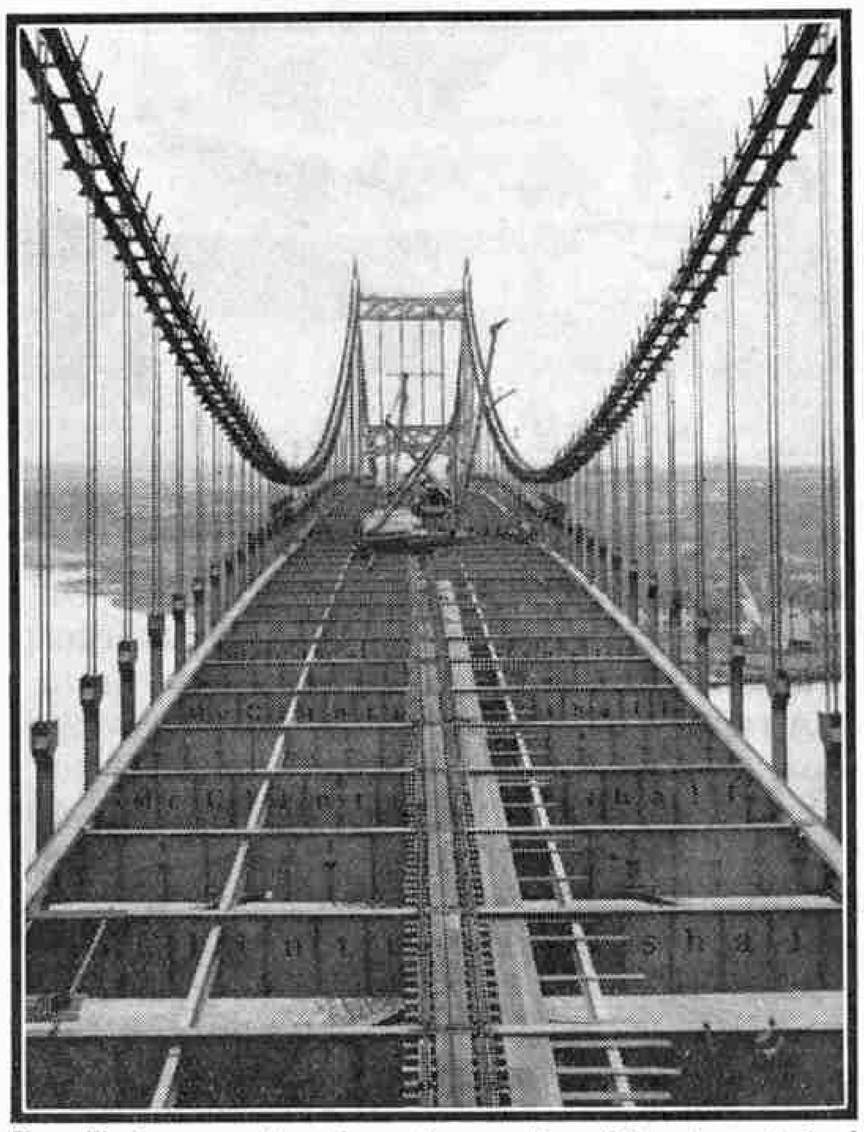
Of the remaining three bridges, the most interesting is that crossing the Harlem River. The main span of this is only 310 ft. in length, but it can be lifted vertically from its normal height of 55 ft. above the water to give a clearance of 135 ft. The purpose of this is to allow the passage of vessels with high masts, an infrequent occurrence. Heavy piers 50 ft. in height support the bridge towers, which are unusually substantial and reach a height of 220 ft., and the main span is flanked by two others 152 ft. 9 in. and 241 ft. 9¼ in. in length respectively. The vertical lift span of this bridge was constructed on floats and hoisted bodily into position. Its deck area is 29,000 sq. ft., and in this respect it is the largest of its kind ever built.



The supporting pillars of part of the viaduct under construction. This view was taken from the top of one of the towers of the East River suspension bridge.

The bridge giving communication with the Bronx has three spans, the central one being 350 ft. long and the total length 600 ft. The clearance above high water is 50 ft. The Bronx Kills, the waterway beneath this bridge, is not navigable. For this reason a fixed bridge was sufficient, but the central span has been so designed that it can readily be converted into a vertical lift span if the Bronx Kills should ever be made into a highway for shipping.

The viaducts joining these bridges consist of a series of plate girder spans varying from 64 ft. to 125 ft. in length, and six similar spans of 125 ft. bridge Little Hell Gate, the narrow waterway between the two islands. It was necessary to build cofferdams in order to construct the piers of this bridge. Each cofferdam was circular and was made of steel. It was driven right down into contact with the rock bottom of the waterway, and was sealed by placing specially-prepared concrete between the steel and a timber framing inside it. The timber then was removed and the water inside the cofferdam was pumped out, after which the concrete required for the pier bases was pumped into the space within the steel cylinder.



Travelling cranes at work on the erection of the floor steel of the suspension bridge crossing the East River.

The most interesting feature of the great viaduct is the junction of the Manhattan branch with the section that sweeps straight across the islands from the East River bridge to that leading to the Bronx. This is the key to the entire system of bridges and roads. It is built entirely of reinforced concrete and is a massive structure containing 70,000 cu. yd. of concrete and 5,900 tons of steel supported on over 1,700 concrete columns. The roads on it have been laid out to avoid crossings. The four tracks from the Manhattan branch join the straight through portion of the viaduct system by means of great sweeping curves, and two of them burrow under it in order to form the junctions on the correct side to give a continuous and easy flow of traffic.

The toll gates are placed at this junction, 10 between Queens and Bronx and 12 on the branches leading to Manhattan. All the roads are of ample width, that connecting Manhattan with the junction being 200 ft. wide. The road deck consists of a 7 in. concrete structural slab covered by a 4 in. concrete wearing surface, and is laid in panels averaging 75 ft. in length. Most of the great system of thoroughfares crossing the rivers and islands is built at the same elevation, and ramps have been built at the approaches from the three boroughs it unites in order to give easy access to it.

The outstanding feature of the Triborough Bridge is not the size or novelty of the bridges and viaducts of which it consists, but the immensity of the undertaking as a whole. Planning the work and organising it was a stupendous task. The staff of designing engineers under the authority constructing the bridge numbered 85, and in addition consulting engineers gave advice and assistance in regard to special features.

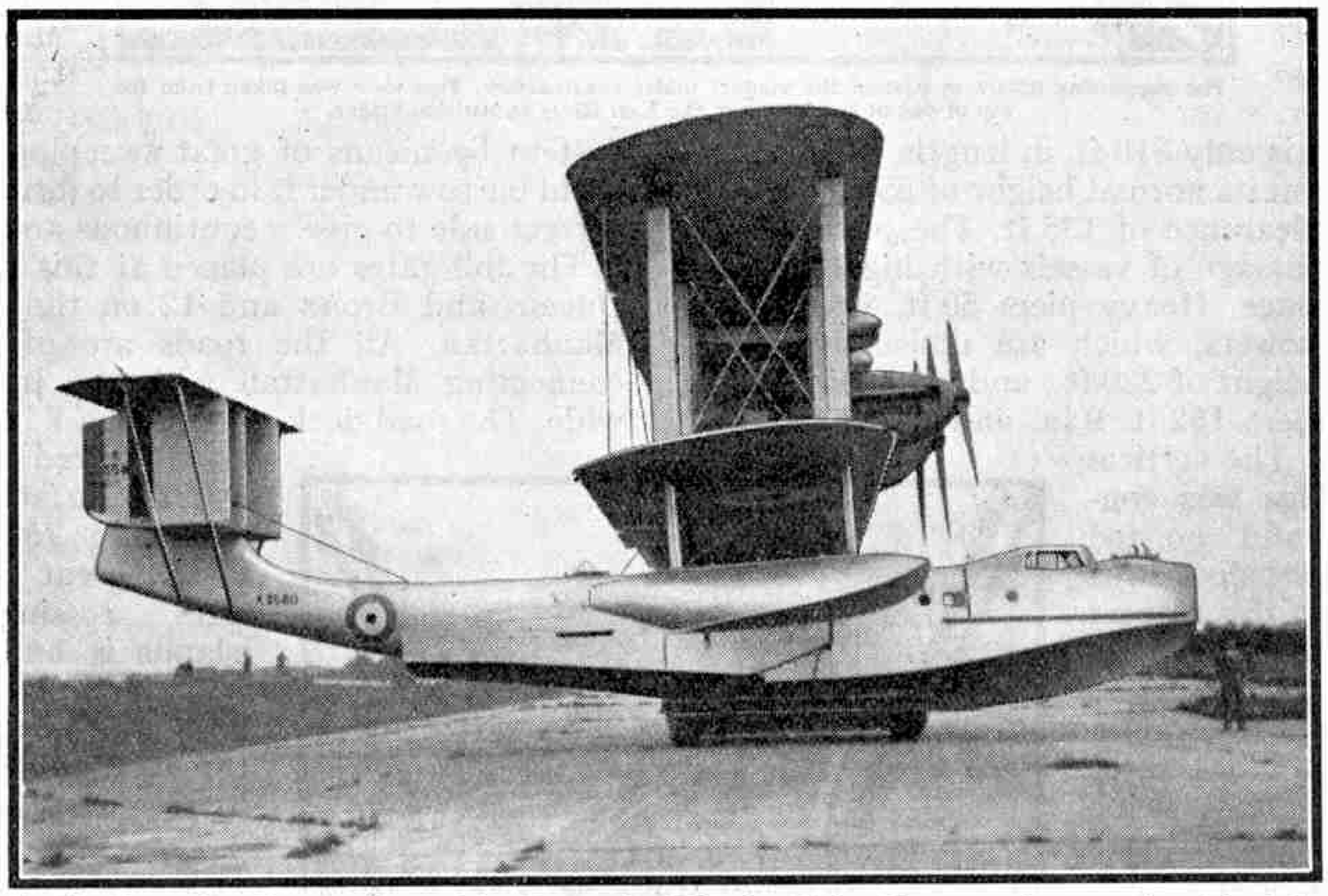
Constructional work actually began in the autumn of 1929, but lack of funds caused it to be suspended in 1932. Early in the following year the Triborough Bridge Authority was constituted and operations were resumed. The peak of activity was reached last spring, when work was in progress at the same time under 28 separate contracts, with a total value of more than £4,000,000. The bridge was opened for traffic on 11th July this year, and its value was quickly shown by the great use made of it.

The Royal Air Force

Work and Equipment of the Service

THE Royal Air Force expansion scheme now being carried out has drawn renewed attention to the many and varied duties of this, the youngest of the Services, and public interest in the types of military aircraft employed is greater to-day than ever before.

The first step towards the formation of an Air Force in this country was taken in 1911, when an Air Battalion, Royal Engineers, was formed, with headquarters at South Farnborough; and in the same year a Naval Flying School was established at Eastchurch. The new branches of the Army and Navy proved so successful that within a year they were separated from those Services and formed the first units of a new one, called the Royal Flying Corps. This Corps consisted of a military wing made up of an airship squadron and two aeroplane squadrons, a Naval wing, an aircraft factory and a flying or training school; and, with the exception of the Naval wing, it was controlled by the War Office. The aircraft of the Corps included a Nieuport monoplane and three Avro training biplanes, each fitted with a 50 h.p. Gnôme engine, and a Breguet biplane with a 60 h.p. Renault engine. There was also a B.E. (British Experimental) biplane, the first heavier-than-air machine produced by the Royal Aircraft Factory.



The Blackburn "Perth" on the slipway. It is a three-engined flying boat designed for reconnaissance and coastal patrol work. This photograph and the upper one opposite are by courtesy of the Blackburn Aeroplane and Motor Co. Ltd.

In July 1914 the Naval wing was separated from the Royal Flying Corps and renamed the Royal Naval Air Service. The aircraft of this new Service took part in the Naval Review of that year, and gave the first demonstration of formation flying. At the outbreak of the War the R.N.A.S. had 39 aeroplanes, 52 seaplanes and six airships, and the R.F.C. had 179 aeroplanes.

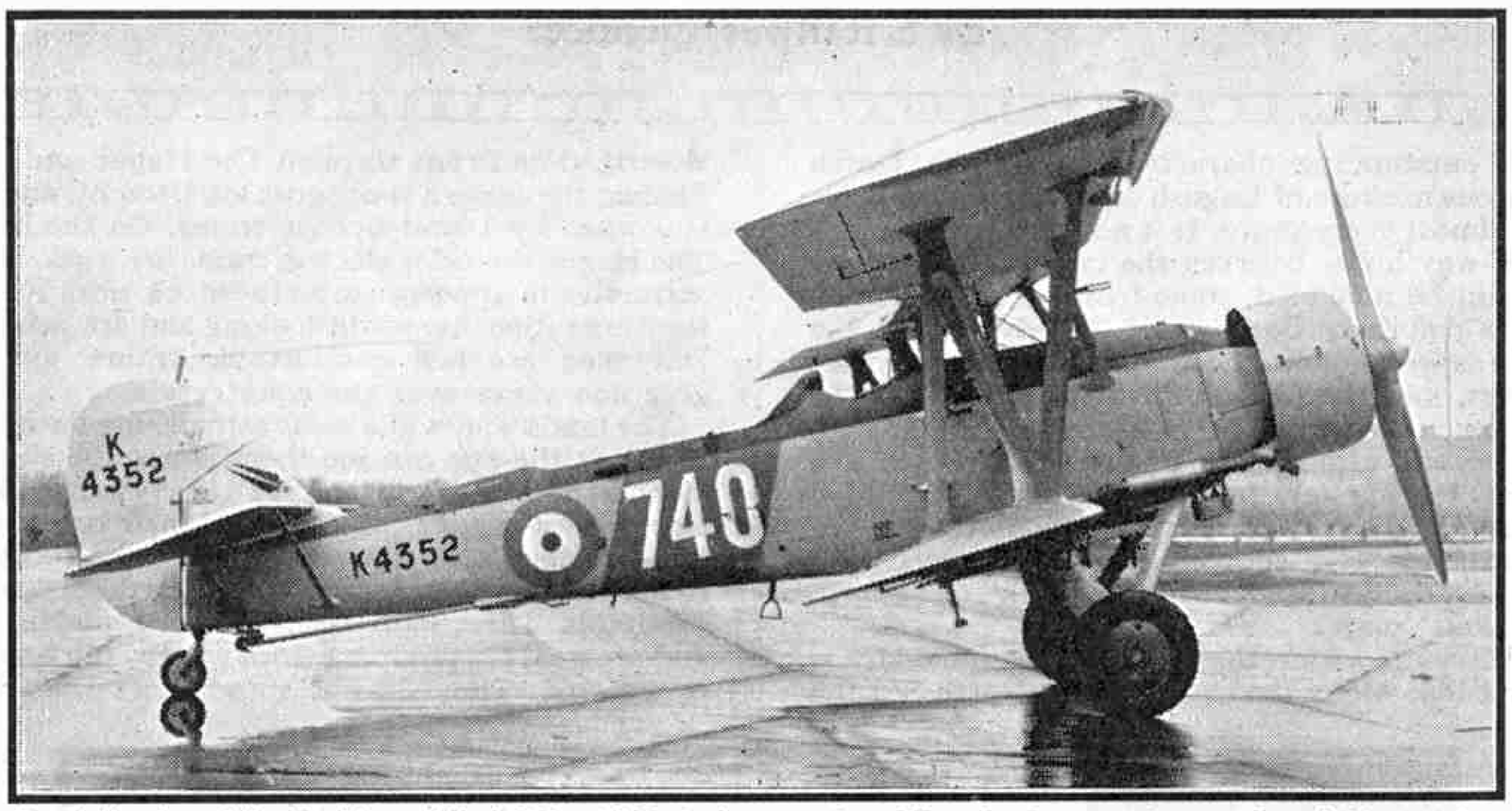
The various types of British aircraft employed during the War have long since become obsolete, but it is interesting to recall them, as although they were much less efficient than the military aeroplanes of to-day, they gave a very good account of themselves. During the early part of the War the R.F.C. were engaged chiefly in reconnaissance work, and the R.N.A.S. in coastal patrolling for submarines and in acting as aerial escorts to troopships crossing the Channel. As improved or entirely new types of aeroplanes were produced, the scope of the flying Services was extended. The R.F.C. carried out air photography, day and night bombing and aerial combats. The R.N.A.S. co-operated with the Fleet during bombardments, by spotting and reporting enemy gun positions; and carried out bombing expeditions, at first from vessels adapted to carry aircraft, and later from specially-built aircraft carriers.

Reference to all the many types of aeroplanes used would make this article into a catalogue, and therefore mention will be made only of some of the types that were of outstanding design, or an account of their high efficiency were produced in very large quantities. The Sopwith 1½-Strutter, for instance, was the first British aeroplane designed as a fighter, and the first to have a fixed gun firing through the airscrew by means of synchronising gear. It was employed also very successfully on air photography flights, bombing expeditions, reconnaissance and escort duty. The French Government were so impressed by its excellent performance that they adapted and standardised the type so that a large number could be produced quickly for their own Air Force. The unusual name was chosen because the aeroplane appeared to have one long and one short interplane strut on each side of the fuselage, when viewed from the front.

A later Sopwith fighter that also was produced in great quantities, but for the R.F.C., was the "Camel" single-seater. This was the first British aeroplane to carry two machine guns synchronised to fire through the airscrew. One of the most interesting aeroplanes was the Sopwith triplane, which was the British reply to the Fokker triplane of the enemy. The three wings of the English machine were staggered, the top one being the most forward and the bottom one the least. It had a maximum speed of 114 m.p.h. and could climb to 15,000 ft. in 19 minutes. The D.H. 4 two-seater fighter, bomber and reconnaissance aeroplane was used chiefly for long-distance bombing, and helped materially to establish the superiority of the R.A.F. during the last year of the War. It was a two-seater single-engined biplane with a top speed of 136.5 m.p.h. Another interesting de Havilland type that gave good service was the D.H.5 single-seater fighter. The wings of this biplane had a pronounced backward stagger, the upper wing being set well back and the lower one more forward than is usually the case.

Some notable types of bombers were used with good effect, one of the most successful being the Handley Page 0/400 long-distance night bomber. It was a formidable aeroplane, and in addition to carrying 16 bombs each weighing about one cwt., it was armed with four Lewis machine guns. The crew consisted of a pilot and two observers. Another big aeroplane of this kind was the Vickers "Vimy," which carried over a ton of bombs and had a range of 900 miles.

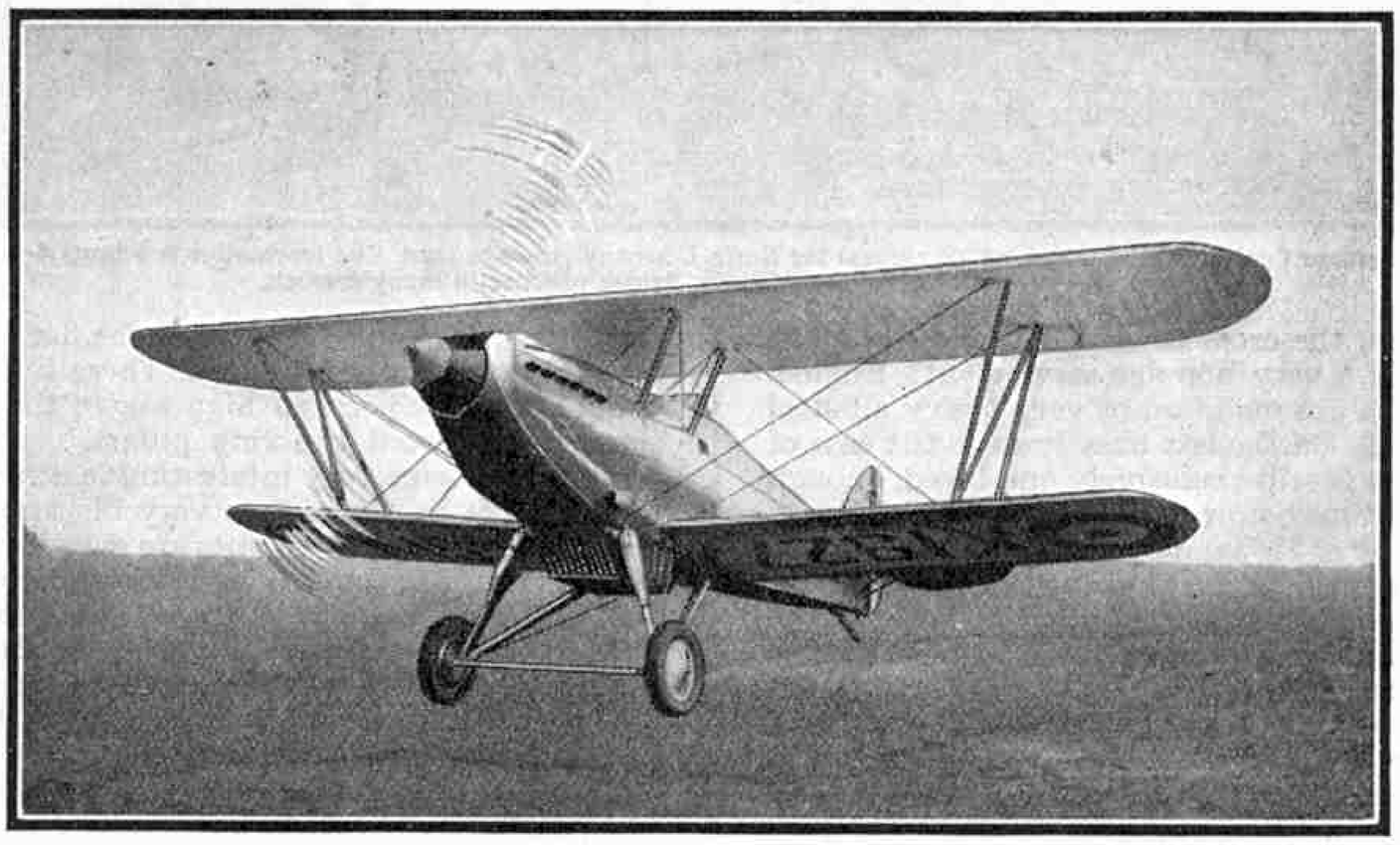
Various types of seaplanes and flying boats were used by the R.N.A.S. Many of the seaplanes were produced by the well-known Short company, and their 320 type was the first seaplane to carry a torpedo.



Broadside view of the Blackburn "Shark" Coastal Protection aeroplane. There is also a seaplane version of this machine.

The R.F.C. and the R.N.A.S. grew so enormously that in April 1918 they were amalgamated to form the Royal Air Force. The rapid development continued, and by November 1918 the R.A.F. equipment included the enormous total of 22,647 aeroplanes. The reduction of this number to a peace-time footing was carried out rapidly, however.

During the 18 years that have passed since the end of the War, the R.A.F. have been far from idle; in fact they have been engaged almost continuously in active service, first in one distant part of the Empire and then in another. The control by this country of Iraq, and later of Palestine, gave the squadrons there many responsibilities. In addition the R.A.F. carry out a great deal of air patrolling along the north-west frontier of India, where the swift reprisals made possible by using aircraft have proved very effective in suppressing warlike tribes. The rapid transport of troops to disaffected areas, the relief of besieged towns and garrisons, and searches for lost long-distance civilian fliers are other urgent tasks performed by the R.A.F. overseas. They also played an important part in surveying the Empire air routes now flown regularly by Imperial Airways.


The Hawker "Fury" single-seater interceptor fighter. It has a top speed of 240 m.p.h. Photograph courtesy of Hawker Engineering Co. Ltd.

These varied duties overseas are reflected in the several types of squadrons that comprise the Service. There are fighter, bomber, bomber-transport, and Army co-operation squadrons, and in the Fleet Air Arm, or Naval branch of the R.A.F., there are corresponding squadrons known as Fleet fighter, Fleet torpedo-bomber and Fleet-spotter-reconnaissance, and several flying boat squadrons.

Under the expansion and reorganisation scheme referred to at the beginning of this article many of the aircraft of these squadrons are being replaced by machines of the latest types. The following notes will indicate the wide range of aeroplanes employed.

The fighter squadrons have several types of single-seater fighters, including the Gloster "Gauntlet" and "Gladiator," described and illustrated in the July 1936 "*M.M.*," and the Hawker "Fury." The Fleet Air Arm employ the Hawker "Nimrod," an adapted version of the "Fury." The work of the Army co-operation squadrons is perhaps less obvious than that of fighter squadrons. They help the Army by obtaining for it air photographs of enemy positions, and also carry out reconnaissance flights. Several types of light aeroplanes are employed, including the Hawker "Audax" and "Hector," and the Westland "Wapiti."

The equipment of the bomber squadron includes day and night bombing machines. Among the former are the Hawker "Hart" and "Hind" "general purpose" biplanes, and the Westland "Wallace." Some of the squadrons have the Boulton Paul "Overstrand." The night bombers are larger machines and include the twin-engined Handley Page "Heyford," which has a top speed of 142 m.p.h. and a range of 920 miles.

The Fleet-spotter-reconnaissance squadrons employ the Fairey "III.F" and "Seal," and the Blackburn "Shark." Blackburn aircraft figure also among the equipment of the Fleet torpedo squadrons, as both "Ripons" and "Baffins" are in service. The coastal-reconnaissance squadrons use several types of flying boats, including the Blackburn "Perth" and the Short "Singapore."

The striking cover to this month's issue is reproduced by courtesy of the Blackburn Aeroplane and Motor Co. Ltd., Brough. It represents an artist's conception of a future type of naval aircraft acting in co-operation with a submarine flotilla.

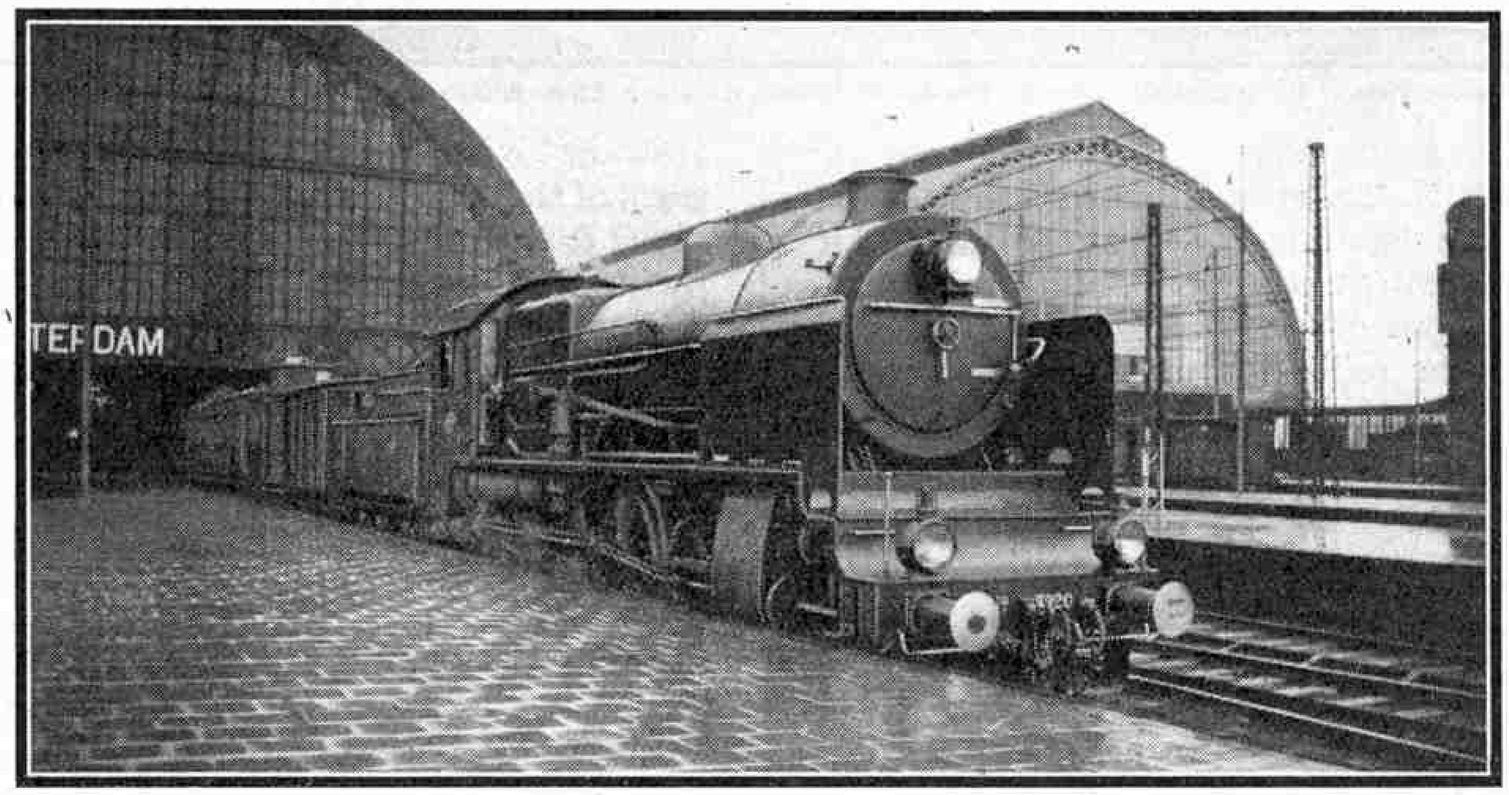
Railway Working in Holland

Steam, Electric, and Diesel Traction

By a Railway Engineer

ONE of the most outstanding characteristics of the Dutch railways is the curious mixture of English and Continental practice that one finds on almost every route. It is not that practice as a whole is a kind of half-way house between the two; the differences are as clear-cut as could be imagined, some features being wholly English, others just as definitely Continental. They run on the right-hand track, use upper-quadrant signals of a shape very strange to English eyes, and the rails are flat-bottomed; but the stations, especially those serving the bigger towns, with their high platforms and quiet serene atmosphere might easily be in the suburbs of London or Manchester, but for the prevalence of a foreign language. Most English of all are the locomotives, with their clean handsome lines and copper-capped chimneys; and one is not in the least surprised to see "Beyer, Peacock" or "Sharp, Stewart" on their makers' plates.

On all the principal services within the country, steam haulage is gradually being superseded. Along the shores of the North Sea the network of electrified lines is slowly extending, while farther east the chief internal services are being worked by Diesel-electric trains. The distances between large towns are so short that nothing in the shape of corridor restaurant car expresses is needed, and a fast and convenient service can be most satisfactorily maintained by multiple-unit vestibule trains, whether Diesel or electrically driven. With the international trains it is quite different. The famous "*Rheingold*" and "*Edelweiss*" expresses begin their journeys to Switzerland at Amsterdam; the cross-country express from The Hook of Holland to Berlin is a very popular service with English travellers; and all these trains are made up of very heavy all-steel coaches, and are steam hauled. On the less busy lines to the east of the Zuider Zee steam traction is still exclusively employed, though no doubt it is only a matter of time before Diesel trains are used here.



Amsterdam Central Station, showing an express for North Germany ready to start. The locomotive is a large 4-6-0 and, like most Dutch engines, follows British practice in many respects.

The short run from the Hook of Holland up to Rotterdam forms a very striking introduction to the Dutch railways. This is the latest section to be electrified, and the service is operated by some of the most remarkable multiple-unit trains that have been put into service anywhere in the world. The trains are made up of two-car articulated sets; each end is carefully streamlined and an additional cowling is provided over the bogies to assist in reducing air resistance. The power supply is 1,500 volts D.C., using overhead conductors. The coaches are finished externally in a handsome colour scheme of grey and scarlet, while the interior effect is entirely grey, relieved by a liberal amount of chromium plating. In addition to being good to look at and supremely comfortable to ride in, these trains are capable of really startling performance. In some trials carried out on the main line between Rotterdam and Amsterdam, one two-car set attained a speed of 100.6 m.p.h.! Of course the speeds demanded on the service between The Hook and Rotterdam are very much less than this, but after each station stop the acceleration was perfectly astounding. Every time we were up to 55 m.p.h. in about three-quarters of a mile from the start, and then the motorman eased up for the rest of the distance on to the next station.

I was bound for Amsterdam, and so alighted from this remarkable train at Schiedam, a junction just on the outskirts of Rotterdam where the main line comes in from the north. There are alternative routes between Rotterdam and Amsterdam. The western one is electrified and runs through The Hague and the university city of Leiden; the eastern route goes via Utrecht, and the inter-city service is worked by Diesel-electric trains. On the line to Amsterdam via The Hague the older electric trains are used. These are not nearly so attractive in appearance as the stock working on the Hook branch; they are rather American-looking and are painted a dull olive-green. But they are fast comfortable trains, and their big windows give fine views over the countryside.

The landscape is of a most astonishing flatness. In every direction as far as the eye can see there is not the slightest undulation, let alone as much as a hill; and it all lies below sea level. Every few miles the railway crosses canals; along their banks are built picturesque little villages, and there are usually one or two windmills in sight somewhere on the broad horizon. In the fields are numerous dwarf windmills. These look like large scale-models of the full-sized ones and are used for pumping work where only a small amount of power is required. They do not stand more than 10 ft. or 12 ft. high.

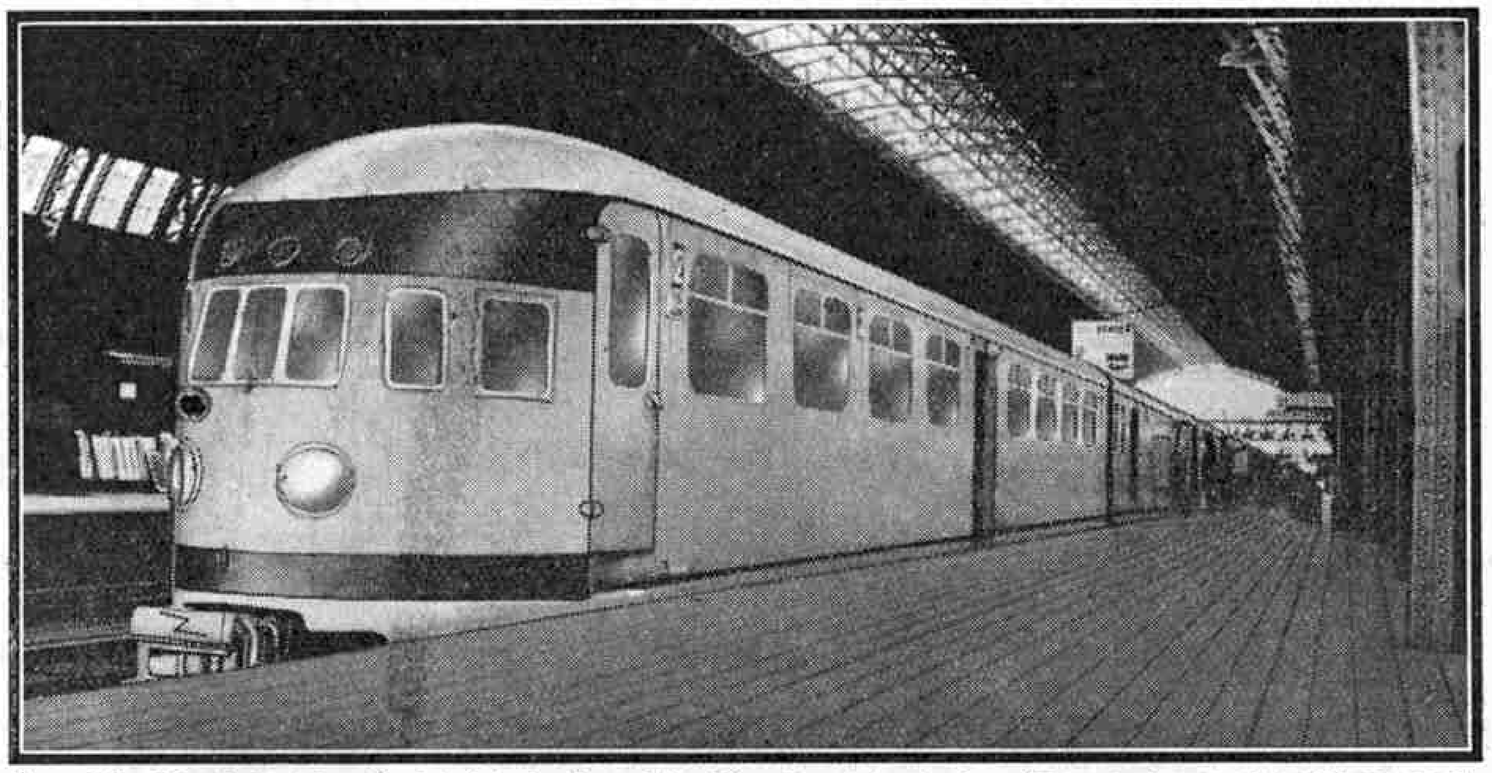
By now the train is nearing Delft, one of the most picturesque cities in all Holland; and there are pleasing glimpses from the train just after leaving the station. The town is intersected by a number of canals, the banks of which are lined with trees; two glorious church towers rise above the red-tiled roofs, and alongside the canal that runs parallel to the railway for some distance is a very fine windmill, right in the town. Just beyond this point is a notable example of a modern Dutch signal box. It is built in reinforced concrete, almost entirely glazed on three sides, and the flat roof is overhung to provide an awning over the windows. There is no ground floor at all; the cabin proper is perched high above the track, supported on four slender reinforced concrete pillars.

There are some very interesting features in modern Dutch signalling. Except in one or two very big stations, where electric point machines are used, the points are everywhere worked on the double-wire system. The underlying principle of this method of operation is that of an ordinary belt drive. The point lever, instead of being pulled through a small angle as in English practice, is moved through a full semi-circle, and to the lever is fixed a pulley wheel that revolves about the same centre as that round which the lever pivots. Adjacent to the points is a corresponding pulley wheel which is turned through half a revolution when the cabin lever is operated. The points are operated off this pulley by a mechanism just like the piston rod and connecting rod of an engine; in the case of double-wire worked points however the action is reversed, for the wheel drives the "piston." The work of throwing a pair of points is far too great for a simple belt to be used, and the wire is stoutly coupled to the pulleys at each end. The same principle is used for working signals.

At a distance of 5½ miles beyond Delft is The Hague. Here a cross-country line from Utrecht comes in, over which the service is worked by Diesel-electric trains. As befits the capital city of Holland, The Hague has a fine station, very English in appearance, with of course the difference that trains run on the right-hand track instead of the left. Just as we arrived the southbound "*Edelweiss Express*" was leaving. This famous train is composed entirely of Pullman cars, and leaving Amsterdam at 8.6 a.m. serves Antwerp, Brussels, Luxemburg, Metz and Strasburg, reaching Basle at 6 p.m. Over the Dutch

portion of the journey the load is one of only four coaches, but farther south it becomes a very heavy train. This western route between Rotterdam and Amsterdam is also used by the through expresses from France, of which *"L'Etoille du Nord"* is the most celebrated.

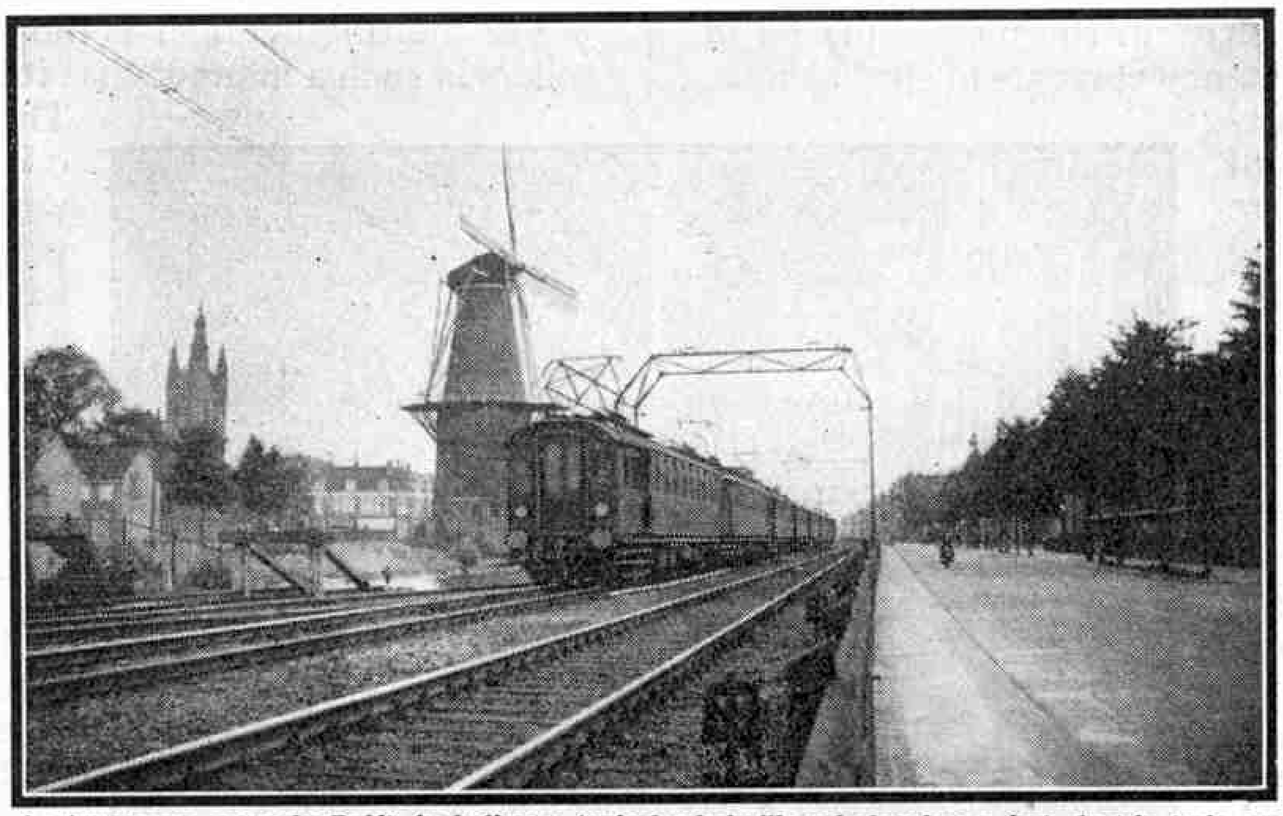
These trains are hauled by handsome four-cylinder 4–6–0s, the design of which was prepared by Beyer, Peacock and Co. Ltd. in consultation with the Dutch authorities. Steam train schedules in Holland, though quite smart, do not demand any very high speed, and a diameter of 6 ft. for the coupled wheels has been standardised. The cylinders of these particular engines are 15¾ in. in diameter by 26 in. stroke, and these ample dimensions coupled with a boiler pressure of 170 lb. per sq. in. give them a high accelerative capacity. The *"Edelweiss Express"* has no run longer than 40 miles in Holland, but on each section speed usually rises to over 60 m.p.h. The engines are painted olive green, but this rather drab colour is wonderfully set off by the copper-capped chimney and polished brass dome and safety valve casing. The numerous "gadgets" usually found on and around the boiler on Continental engines are conspicuous by their absence, and the only feature that differs in any way from English practice is the use of large electric headlamps.



One of the Diesel-electric articulated trains bound for Utrecht, at Amsterdam. These trains consist of three-coach units, the centre vehicle containing the engine and the luggage compartments.

From The Hague the line runs north through Leiden and Lisse to Haarlem. The country throughout is dead flat, and one is never far from the sea. In many places can be seen the long range of sand dunes that act as a natural bulwark to the low-lying country inland. In a comfortable electric train we bowled along at a steady 50 m.p.h. with surpassing smoothness, and then, approaching Haarlem, we passed through the world-famous bulb fields; it was August and the gladioli were a magnificent sight. Haarlem is an important junction; a short branch from the seaside town of Zandvoort comes in from the west, and another electrified line runs northward to Alkmaar, famed for its cheese. The main line swings round due east, and a run of 11¾ miles brings us to Amsterdam.

This last stretch has a most unusual interest. For almost its entire length there are parallel tracks for five different modes of transport. On the extreme left, looking towards Amsterdam, is the railway; then in order comes a canal, a highway for fast motor traffic, a special track for bicycles, and last of all a path for pedestrians. As if this were not enough, a few miles to the north is the big sea-level canal that connects Amsterdam with the sea; along this waterway ocean-going ships can often be seen.



A picturesque scene in Delft, including a typical windmill and showing a fast electric train on the run between Rotterdam and Amsterdam.

At Amsterdam Central station practically every phase of Dutch railway working can be observed. On the western side electric trains from Rotterdam, Zandvoort, and Alkmaar are coming and going every few minutes. Important international expresses arrive from all parts of Europe. The dark sepia cars of the Northern Railway of France are familiar objects; there are coaches of the International Sleeping Car Company, and all coming in on trains drawn by the English-looking 4–6–0 engines. The eastern end of the station bears a different complexion altogether. Here are to be seen expresses destined for all parts of Germany, some carrying through coaches for places still farther afield. The very distinctive Mitropa stock is largely used on these trains; all-steel construction is employed for ordinary carriages, dining cars, and sleeping cars alike, and they are painted a reddish-maroon colour that makes them recognisable anywhere. To an English traveller, accustomed to much timber work in coaches, they take some getting used to, with the clanging of steel doors and a chill to the touch; but they ride superbly and the internal decoration of the dining cars is most ornate.

On the routes running east from Amsterdam the latest type 4–6–0 engines are extensively used. They are slightly more powerful than the "Beyer, Peacock" type previously mentioned, having four cylinders 16½ in. in diameter by 26 in. stroke. The boiler is pitched considerably higher, and smoke deflecting plates are fitted at the front end, but still they are definitely English in appearance. This is perhaps more remarkable than in the case of the earlier engines, for the new type have all been built by the German firm of Henschel and Sohn of Cassel. Quite recently one of them was completely streamlined, not with a view to any ultra-rapid running, but in an attempt to reduce coal consumption.

Alongside these handsome steam-hauled trains may be seen the Diesel-electrics. In outward appearance they are very similar to the latest electric trains working on the Rotterdam–Hook service. They consist of three-coach articulated sets in which the centre coach contains the engines and luggage compartments. There are two engines to each three-car set, driving on to the two centre bogies. Each engine is of the Maybach 12-cylinder V-type, using airless injection, running at 1,400 r.p.m. and driving a D.C. generator that supplies current to the four motors, each of which is coupled direct to one of the bogie axles. These three-car trains develop no less than 820 h.p. and they have been tested up to 87 m.p.h.; in ordinary service however the speed rarely exceeds 60 m.p.h.

By way of contrast to these ultra-modern developments the branch lines in quiet country districts provide a most interesting study. Here traffic moves very sedately, the rolling stock consists chiefly of very spartan four-wheelers, and speed rarely exceeds 35 m.p.h. But for all that there is a wealth of interest about these placid branches. The historic seaport town of Hoorn, on the western shore of the Zuider Zee, is a fascinating railway centre. One evening when I was returning to Amsterdam a very odd collection of engines was on view. There were two "Beyer, Peacock" 4–4–0s built as long ago as 1892; they sported very tall chimneys and tiny boilers, but what made them still more ancient-looking was a huge bell-shaped dome. One of them was working a cross-country local to Alkmaar that consisted of three four-wheeled coaches!

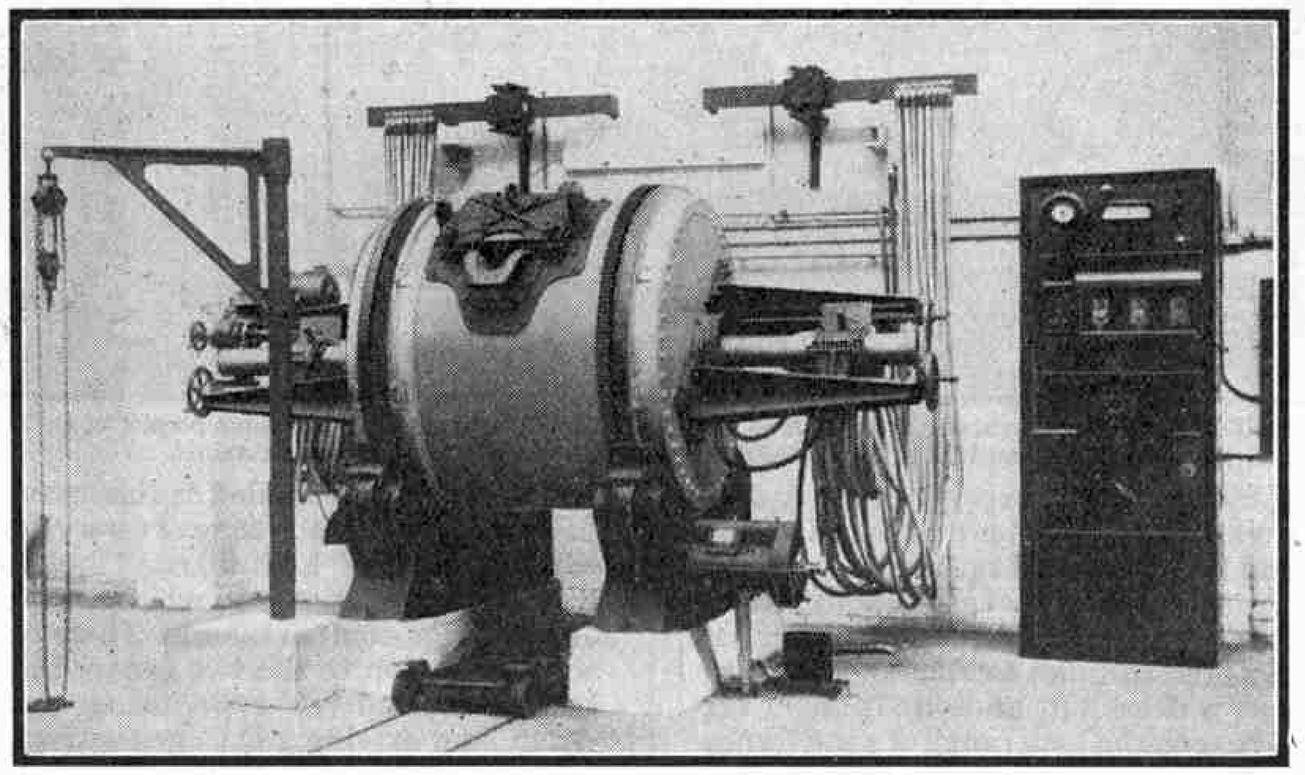
Slightly more modern was a double-framed "Sharp, Stewart" 4–4–0, and then, just as I was studying this old "bus," what would rank as a fast train on this line arrived behind a handsome Dutch-built 4–4–0. In outward appearance this could best be described as a much enlarged edition of the early "Beyer" type, including even the bell-shaped dome. My own train, which consisted of only two coaches, was drawn by a 4–4–4 tank engine that bore a strong family likeness to the 4–4–0 just mentioned. We jogged along at a merry 27 to 28 m.p.h. between stops, and so reached Zaandam, where the electrified line from Alkmaar to Amsterdam is joined.

Even on these quiet unhurried routes traffic though slow is very punctually operated. So Zaandam, where the two extremes meet and one transfers from the placid "steamer" to the rapid bustling electric, is a good place to take leave of the Dutch Railways.

Furnaces that are Rocked at Work

Melting Metals by the Electric Arc

DURING the last 20 years or so the study of the structure of metals and the processes of refining them have both made great progress. One important result has been the development of many valuable new alloys, each possessing qualities that make it particularly suitable for some definite industrial purpose. The special features of an alloy depend to a great degree on the purity and consistency of its ingredients. Considerable skill and care are required in making them, and the necessary processes usually are carried out in enclosed furnaces heated electrically. In these the metal is not "burned" or oxidised, as it might be when heated in an ordinary furnace, and the product therefore is pure.



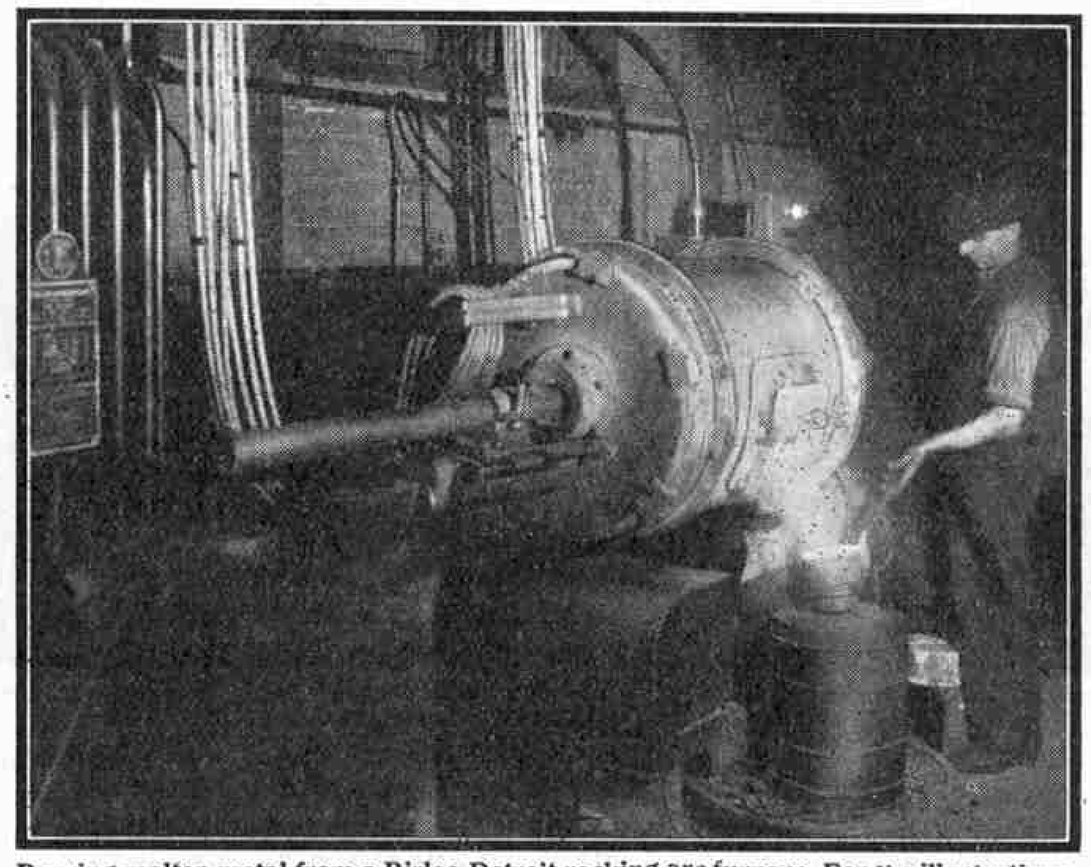
A Birlec-Detroit rocking arc melting furnace in which 1,000 lb. of metal can be melted at a single charge.

The main types of electric furnace are the induction, the resistance, and the rocking arc furnace, each of which has its special uses. Induction furnaces owe their heating effect to eddy currents induced in the metals placed in them by means of high-frequency currents in special coils. They are used to a great extent for the manufacture of high grade steel, and are made with capacities ranging from about 100 lb. to 5 tons. About 90 furnaces of this kind are in use in various parts of England. Furnaces in which heat is produced by passing current through resistances are employed principally for heat treating iron, steel and other metals, and for pottery making.

The rocking arc furnace is used when comparatively small castings in metals such as high test malleable or cast iron, nickel silver, and various bronzes are required. The illustrations on this page show two examples of the Birlec-Detroit furnace, which is made in this country by Birmingham Electric Furnaces Ltd., Birmingham. In a furnace of this kind the metal is melted by means of the heat of an electric arc formed or "struck" inside a cylindrical chamber that is rocked about its axis. In this manner rapid heating of the metal is obtained and the constituents of the alloy are evenly distributed. Two important advantages of this method are that a rocking arc furnace can be installed in any part of a works or laboratory, and that it permits the rapid production of alloys of consistent composition and quality without the necessity for skilled operation.

The furnace is lined with special heat-resisting bricks and is provided with a combined charging, opening and pouring spout. The electric arc is formed between two graphite electrodes that enter the chamber at opposite ends, and as the chamber is effectively closed there is little loss of heat and very high efficiency is obtained, while no air can enter to oxidise the molten metal. The furnace can readily be cleaned out after emptying it of its charge, and different alloys can be melted in consecutive heatings, a great advantage in a foundry producing a wide range of castings in different metals.

The melting cylinder is mounted at each end on steel rollers in such a manner that it is free to rotate on its axis. The rocking motion is imparted to it by an electric motor, which is provided with a patented reversing mechanism, and its speed is increased, either automatically or by hand, as melting progresses. A special control device enables the rocking motion to be controlled in a suitable manner for every type of charge, starting with a small oscillation and increasing at a controlled rate to the maximum value. The movement stirs the molten metals, giving thorough mixing that ensures uniformity in the charge, so that every casting from it has exactly the same composition and properties. It also serves to bring every portion of the charge into contact with all parts of the heated furnace lining. The result is that the rate of melting is greatly increased, and at the same time overheating of any part of the lining is prevented. A charge of brass can be melted in about 25 to 30 minutes, while the melting time for iron is from 50 to 60 minutes. The electrodes are arranged either for hand or automatic control.



Pouring molten metal from a Birlec-Detroit rocking arc furnace. For the illustrations on this page we are indebted to Birmingham Electric Furnaces Ltd., Birmingham.

Flying Nearly 9½ Miles High

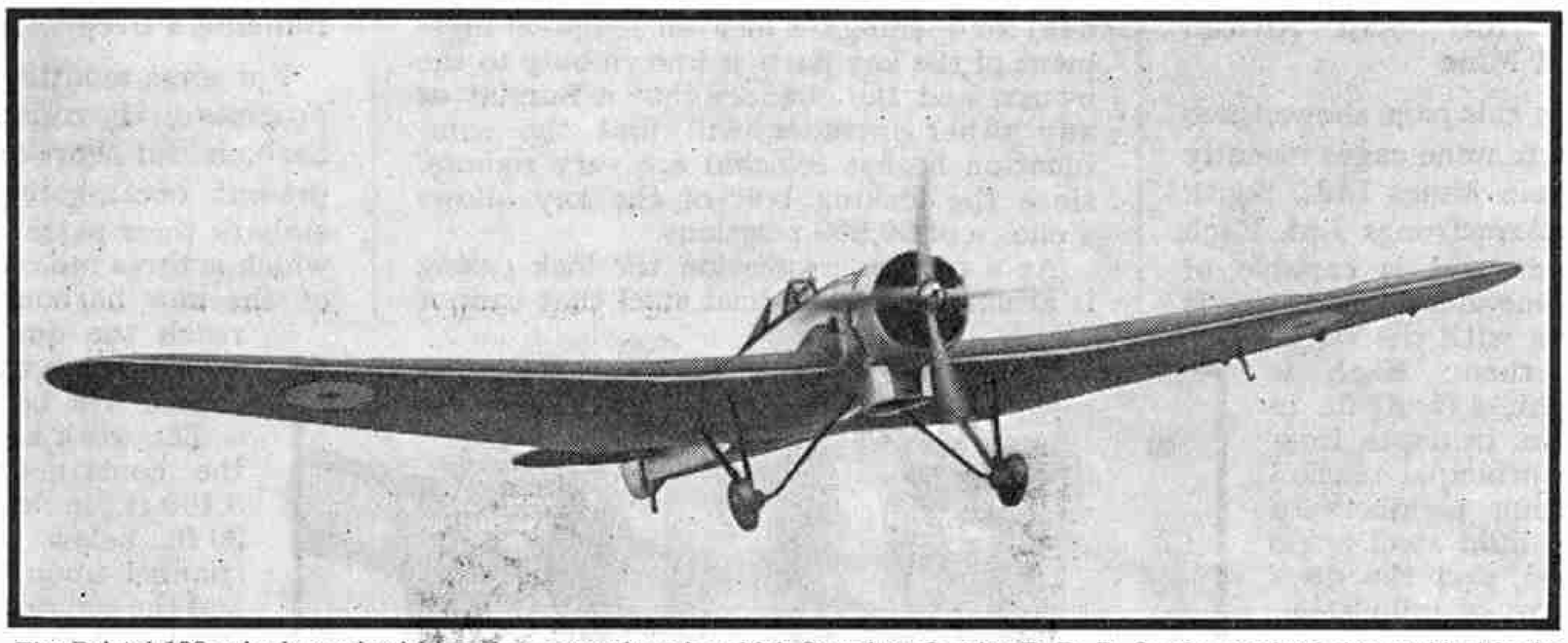
Britain Regains World Altitude Record

THE first aeroplane flight officially confirmed as a world altitude record for heavier-than-air aircraft was achieved by Hubert Latham, an English airman, at Rheims on 29th August, 1909. He flew an Antoinette monoplane and reached a height of 509 ft. During the 27 years since then the height to which aircraft can climb has increased enormously, and the record for the highest flight has been held successively by various countries, including France, Germany, England (from 1932 to 1935), and Italy. It was won from Italy in August this year when M. Detre, a French airman, reached a height of 48,698 ft. He flew a Potez aeroplane fitted with a Gnôme-Rhône engine. On 28th September last the record was regained for Britain by Squadron Leader R. F. D. Swain, of the Experimental Section of the Royal Aircraft Factory, Farnborough, who flew to a height of 49,967 ft., or nearly 9½ miles.

He took off from Farnborough at 7.30 a.m., clad in a special sealed suit that could be inflated to a pressure adequate to sustain life at any altitude. This suit was essential, as at heights above 43,000 ft. it is necessary to resort to some means of artificially increasing the pressure in the lungs. The lower illustration gives a good idea of the appearance of the suit, which is made of rubberised fabric and is fitted with a helmet that is of the same material and has a large curved double window. The suit is made in two pieces, and is joined at the waist. A panel is incorporated in the helmet to enable the occupant to free his head quickly in an emergency. Oxygen is fed into the breathing circuit at the required rate, the oxygen jet being the driving element of a small injector that produces rapid circulation of gas round the system. The gas passes from the injector through a flexible tube, enters the helmet on the right-hand side of the face, and passes across the face to an outlet on the left. It now contains the exhaled breath, and passes down a flexible tube to a canister containing chemicals that absorb the carbon dioxide and moisture from the breath. The gas then issues from the canister outlet in pure condition, ready for recirculation.

After taking-off Squadron Leader Swain climbed in wide circles until he reached a height of 40,000 ft., when he turned south-east and climbed about another 5,000 ft. He said afterward that at that height the light was almost dazzling, but he had taken the precaution to guard against the glare by having all the external parts of the aeroplane that could catch his eye painted black. He added that the sky above appeared a very deep blue, but that no stars were visible. The deep colour was due to the air being free from dust and moisture, and to the complete absence of cloud above 35,000 ft. The exceptional height enabled him to see a great distance, and when flying about 10 miles north of Brighton he could see northward as far as the Wash and westward as far as Land's End.

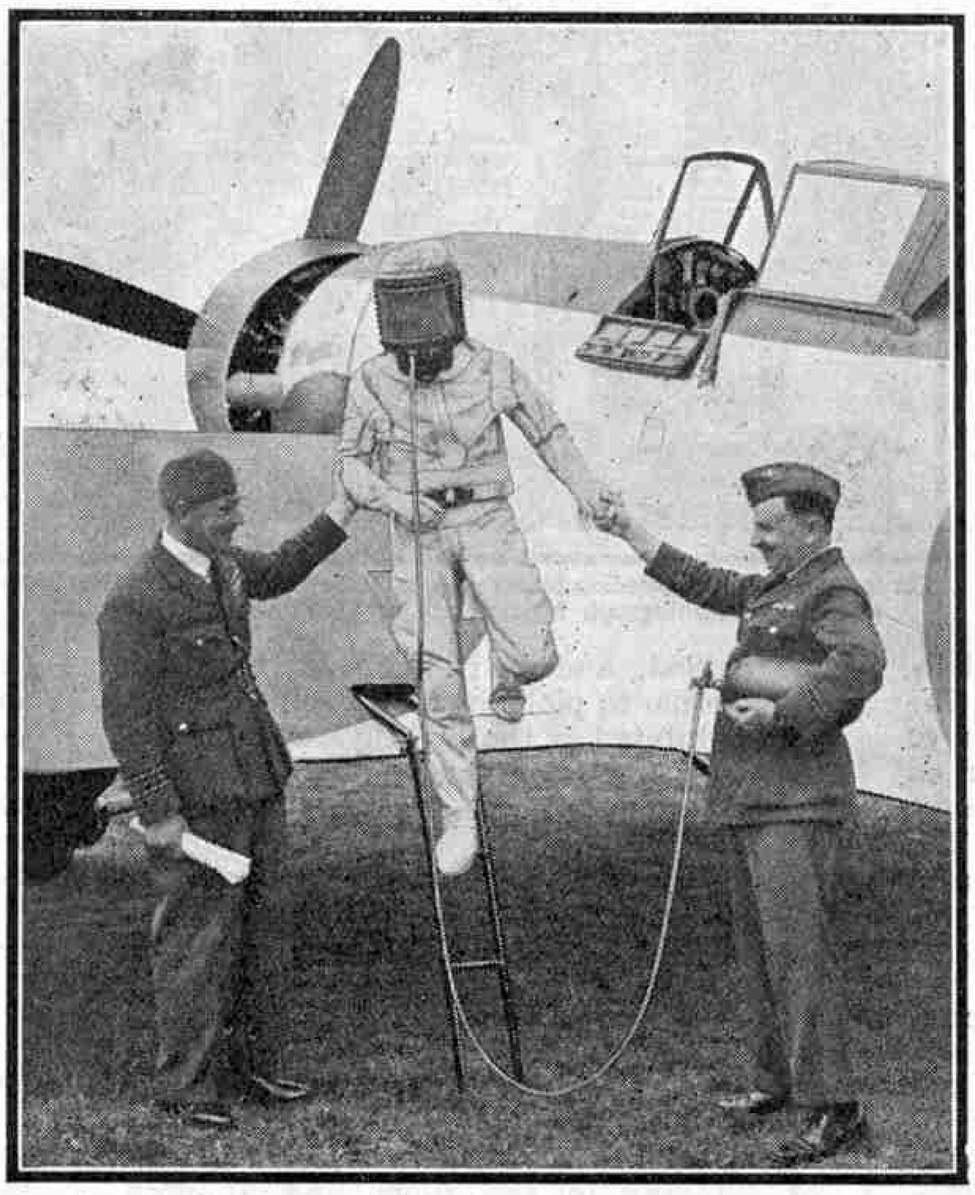
A strong north-west wind was blowing, and heading his machine into it he climbed steadily until he reached the record height of 49,967 ft.



The Bristol 138a single-engined low wing monoplane in which Squadron Leader F. R. D. Swain regained the world altitude record for Britain. Photographs on this page by courtesy of "Flight."

The flight back to earth was exciting. When he began it he was almost over the Bristol Channel. He had glided downward about 5,000 ft. when the window of his helmet and those of the cockpit became misted over, only the brilliant sunlight penetrating them and he was forced to fly blind. A growing feeling of suffocation caused him to believe he was running short of oxygen, and when he found he could not press the release lever that would open the roof of the cockpit, or open the panel of his helmet, he became desperate. In spite of his failing strength he managed to grasp the sheath knife hung in the cockpit for use in emergency, and he cut open the window of his helmet. Immediately there was a welcome inrush of fresh air that revived him and relieved his fear of suffocation.

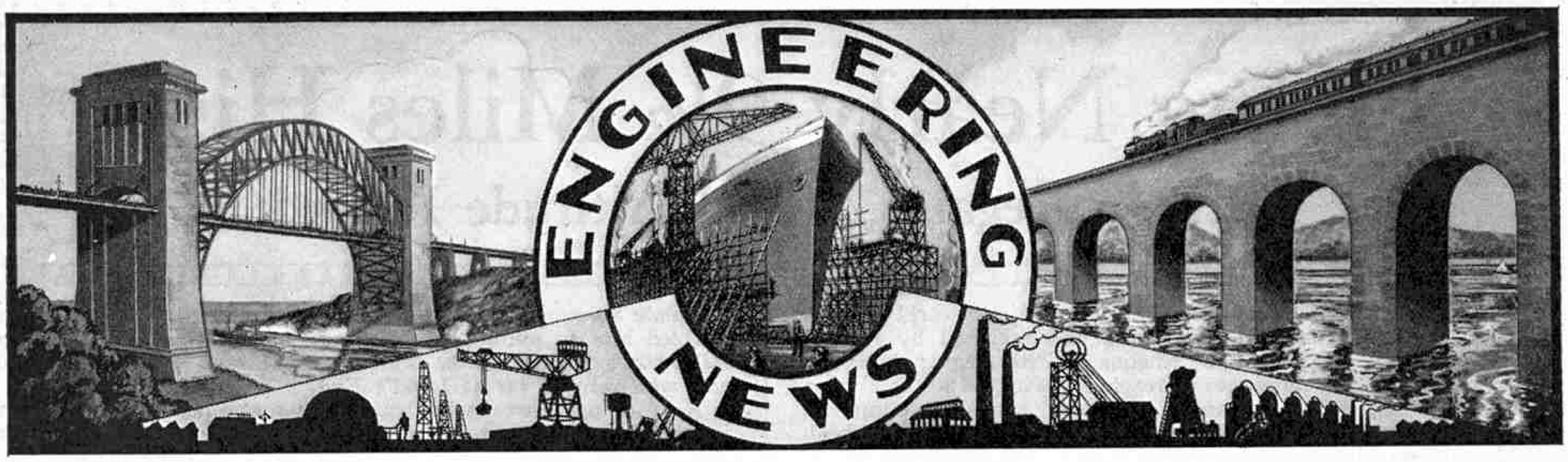
A glance at his altimeter showed that he had descended to 14,000 ft., and he also observed that he was flying in the neighbourhood of Yeovil. He therefore turned eastward, and still gradually descending, he eventually arrived over Salisbury; and landed safely at Netheravon, with barely two gallons of petrol left. He found that he had been mistaken in thinking that his oxygen supply was running out, and that the feeling of suffocation had been due to his exhaustion.



Squadron Leader Swain, clad in his special suit, descending from the aeroplane after his record flight.

The aeroplane used by Squadron Leader Swain was a new low wing cantilever monoplane designed specially for flights at heights of 50,000 ft. and over, and produced by the Bristol Aeroplane and Motor Co. Ltd., to the order of the Air Ministry. It was also designed so that it could be used in an attempt to break the altitude record for heavier-than-air aircraft, and now that this has been accomplished it will be used to investigate the special problems involved in the operation of aeroplanes, and in the functioning of aircraft equipment and instruments, at extreme altitudes. The Bristol 138a, as it is called, is one of the largest single-seater aeroplanes ever built, and has a wing span of 66 ft. It is exceptionally light for an unbraced monoplane of such large span, as it is built throughout of wood, except for the engine mounting and the cowling.

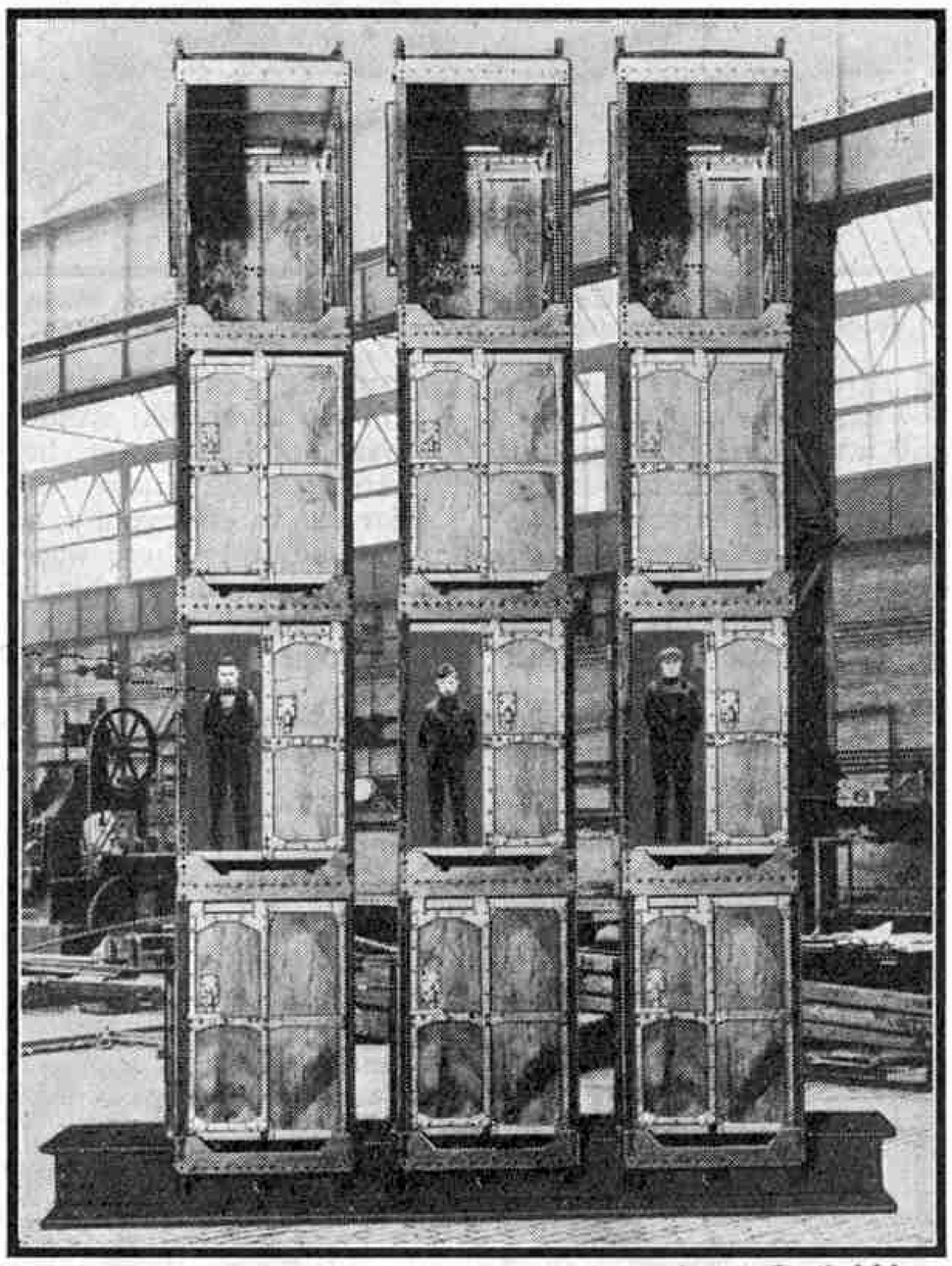
At the time of writing preparations for a further flight are being made, and Sq. Ldr. Swain's record may have been beaten before this issue appears.



Four-Decker Cages for South African Gold Mine

The illustration on this page shows three four-decker duralumin mine cages recently built for Daggafontein Mines Ltd., South Africa, by Vickers-Armstrongs Ltd. Each cage weighs 3½ tons and is capable of carrying 80 men. Some idea of their size is given by comparison with the workpeople shown in them. Each is 26 ft. 11 in. in height, 4 ft. 8¼ in. in width, and 5 ft. 11 in. in depth from back to front. The principal tension supporting and lifting members of the cages consist of mild steel angle and channel sections, and the deck plates, which also are of mild steel, are laid on duralumin supports suitably secured to the main members.

On each of the four decks rails are fitted, so that the cages can be used as required for raising ore in trucks only or for a combination of ore and workmen. The sides of the cages are of 1/16th in. thick duralumin plate, and combination hinged and sliding doors are fitted at back and front.



Three duralumin four-decker man cages, built for service at a South African gold mine. Photograph by courtesy of Vickers-Armstrongs Ltd.

A Giant American Generator

A new 110,000-kw turbine generator built by the General Electric Company of New York was recently placed in service in the River Rouge power generating plant of the Ford Motor Company at Fordson, Michigan, U.S.A. The new generator is the first large unit in the world to operate at a steam pressure of 1,200 lb. per sq. in. and 900 deg. F. With the additional capacity afforded by the new generator the Fordson station is now the largest industrial high-pressure steam generating installation in the world, having a total output of 325,000 kw.

The new plant consists of a high-pressure turbine and generator mounted directly on top of a low-pressure turbine and generator. Superheated steam is fed to the upper turbine at 1,200 lb. per sq. in. pressure and 900 deg. F. The generator driven by this turbine is of 55,000 kw capacity, and the steam then flows down into the low-pressure unit, which generates another 55,000 kw. The steam is then exhausted to condensing equipment.

Lock that Cannot be Picked

In a novel safety lock that has been introduced in Germany, the code or safety device is not in the lock itself, but in the key. This is a narrow strip of light metal, with five wards or racks that can be adjusted in various positions, and the lock automatically adapts itself to the key when this is used to close it. A similar key cannot be used for opening the lock, since the arrangement of the key parts is known only to the owner, and the chances that a burglar or any other intruder will find the combination he has selected are very remote, since the locking bolt of the key allows a choice of 99,999 positions.

As a further protection the lock casing is armoured with special steel that cannot be drilled, and it is claimed that it is impossible to pick the lock itself. The lock was exhibited at the Danzig Autumn Fair, where it attracted considerable attention.

Progress on New York Arch Bridge

Rapid progress is being made with the construction of the Henry Hudson arch bridge over the Harlem River at New York. The main span of this bridge will be 800 ft. in length, and will be supported by two arch ribs consisting of silicon steel box girders, 12½ ft. deep, 3½ ft. wide, and spaced on 50-ft. centres. The bridge will give clearance of 140 ft. to shipping in the river, and at each end of it there will be steel viaduct approaches each 300 ft. in length.

Building a Deep-water Harbour in Trinidad

For some months past work has been in progress on the construction of a deep-water harbour for Port-of-Spain, Trinidad. At present ocean-going liners have to disembark their passengers at the anchorage, which is three miles out, but on completion of the new harbour they will be able to reach the quayside, and the inconvenience of a three-mile trip in a small tender will be avoided.

The work now in progress includes the construction of a wharf wall 3,100 ft. in length, the dredging to 30 ft. below water of an approach channel about two miles in length, and the construction of a wide basin in front of the wharf wall. In addition an area of 140 acres behind the wharf wall is being reclaimed and five transit sheds with the necessary rail and road service tracks are being erected.

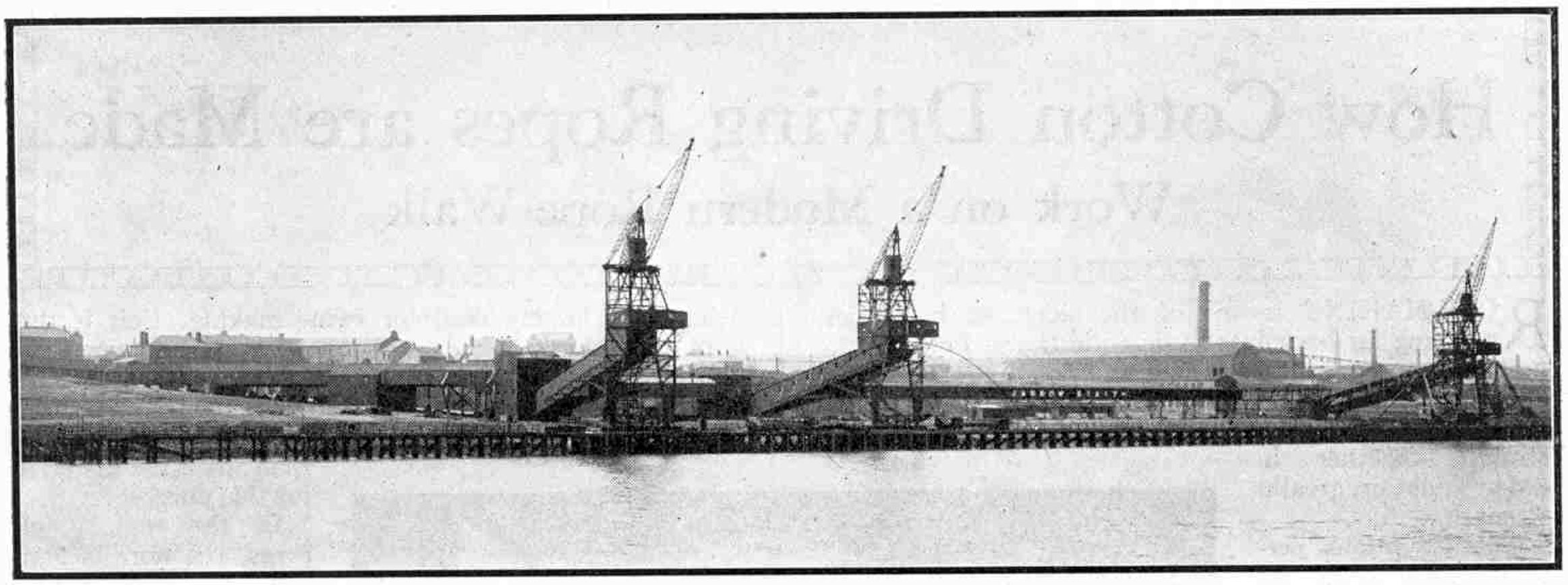
The wharf wall is of concrete deposited between two rows of interlocking steel sheet-piling. The constructional work is being carried out from timber stagings on each side of the wall. Railway tracks laid from these stagings and connected with the local railway system carry the necessary plant for pile-driving, excavation, and concreting.

Sheets of interlocking steel piling at the front and back of the wall site are first driven. The enclosed material is then excavated by grab cranes and deposited behind the wall to form a bank on which narrow-gauge rail tracks were laid for bringing out concrete and other constructional materials from the shore.

The dredged approach channel will have a bottom width of 350 ft., and will be marked by beacons mounted on greenheart stages at the sides of the channel, and by a pair of lights fixed on shore towers. In dredging the channel and the basin in front of the wharf wall over six million cu. yds. of material have to be removed, some of which will be deposited in the reclaimed area at the back of the wharf wall, while the remainder will be dumped at sea in deep water. It is expected that the entire scheme will be completed towards the end of 1938.

Gearless Buses for London

The London Passenger Transport Board has ordered 100 oil-engined buses from Leyland Motors Ltd. The buses will all be similar in outward appearance, but 10 of them will be fitted with Leyland hydraulic torque converters in place of gear transmission systems.



Jarrow's New Coal Shipping Staith

The illustration at the top of this page shows a new coal shipping staith recently constructed by the Tyne Improvement Commission at Jarrow. It has two loading berths, one of which is intended for coaling small ships and is equipped with a single loading tower, while the other has two towers and is suitable for dealing with larger vessels. The staith has a river frontage of 1,309 ft., and provides ample space for two vessels to be loaded simultaneously.

Coal is brought from the collieries in railway wagons to new standing sidings situated about a quarter of a mile from the river. These sidings provide accommodation for 2,000 tons of coal in 20-ton wagons, and for about 127 similar wagons empty. The full wagons gravitate along the sidings to discharging hoppers, and after discharge are raised by automatic electric lifts to the deck of an elevated structure from which they gravitate into the "empty" sidings.

From the hoppers the coal is carried by means of an electrically-driven belt conveyor system over a public street and adjoining land to the three shipping or loading towers on the bank of the river. The towers are mounted on two four-wheeled bogies that run on flat-bottomed rails and are driven through a rack and pinion, with brakes to prevent horizontal movement when strong winds are blowing. Each tower is provided with a sliding loading boom, which is slung by wire ropes at its outer end, and can be raised or lowered to suit all sizes of vessels at any state of the tide.

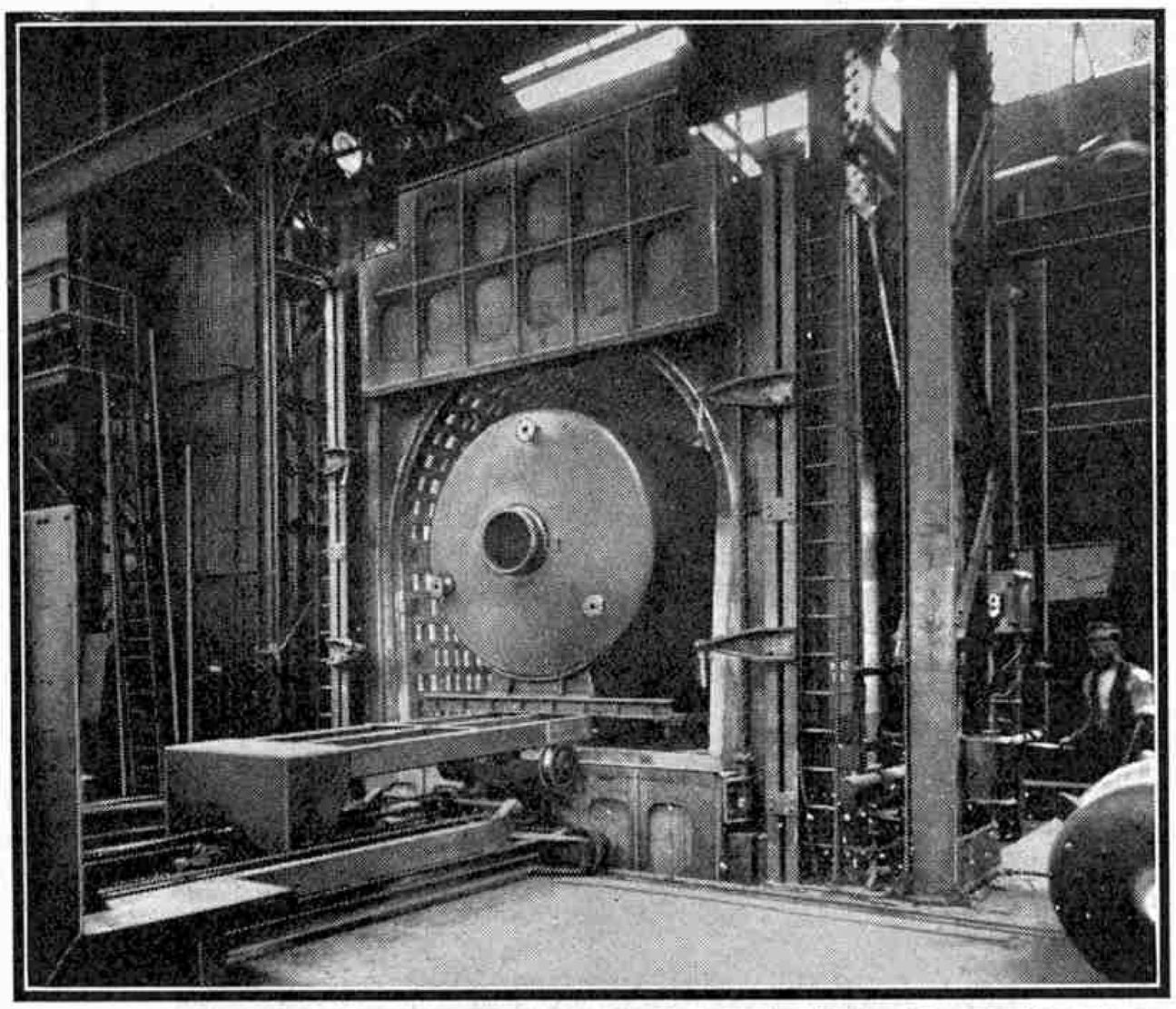
Tunnelling under the Thames

Work will soon begin on the boring of the new tunnel under the River Thames between Dartford and Purfleet. At present there is no bridge or tunnel below Blackwall Tunnel, which is 35 miles from the mouth of the Thames, and as the site of the new tunnel is about 12 miles lower down the estuary it will provide a much needed link between the north and south sides of the waterway.

Work will commence with the boring of a pilot tunnel with an internal diameter of 12 ft., and a length of 900 yds. Two ventilation shafts will be constructed, one on each side of the river, and at the foot of each shaft a chamber 35 ft. in internal diameter will be excavated to serve as a starting-off point for the main tunnel. Each of these shafts will be 100 ft. in depth, and the depth of the pilot tunnel below the bed of the river will be from 20 ft. to 25 ft.

The pilot tunnel will provide valuable information regarding the strata under the river at this point and will give the engineers some idea of the conditions in which the main tunnel will have to be built.

The main tunnel will be rather more than a mile in length. On the north side of the river it will connect with the Purfleet-Grays road; on the south side the approach will be linked with the Dartford Southern by-pass.



A glass-lined milk tank being "fired" in a gas-heated furnace, as described on this page. Photograph by courtesy of the British Commercial Gas Association. The illustration at the head of the page shows the new coal staith at Jarrow, and is reproduced by courtesy of the Tyne Improvement Commission.

Glass Linings for Milk Tanks

Now-a-days there is an increasing tendency to handle widely-used materials in bulk rather than in small quantities. For example, petrol used to be delivered to garages in 2-gallon cans, but now-a-days it is distributed in huge tank wagons to road-side tanks and pumps. Milk formerly was handled in bulk only in the familiar churn, but now it is frequently transported in large tanks mounted on lorries or railway wagons, and similar tanks are used also for storage purposes in food factories.

The tanks usually are lined with glass, and the lower illustration on this page shows the lining of such a tank being fired in a large gas furnace in a Yorkshire works. The inside of the tank is first sprayed with vitreous enamel by an operator wearing a gas mask, then dried by means of a stream of hot air from a flexible pipe and finally vitrified at about 800°Cent. in the gas-fired furnace shown.

World's Steepest Inclined Railway

What is believed to be the world's steepest inclined standard gauge railway is in operation near Ripple, Oregon, U.S.A. It is 3,421 ft. in length and is used for carrying timber logs down the side of a high mountain ridge to the bottom of the canyon of the Salmonberry River.

The railway is designed to operate on the double-track counterbalanced principle, in which a loaded car descends while an empty one ascends, the extra weight of the loaded car being utilised in hauling the empty car. The track commences with a gradient of 1 in 3.6, continues at 1 in 1.3, and finishes at 1 in 2 as it nears the top of the ridge.

The cars weigh 14 tons each when empty and, with 28-ton loads of logs, their descending weight is 42 tons. An average car load is 9,000 ft. of timber, and about 250,000 ft. of timber can be hauled daily.

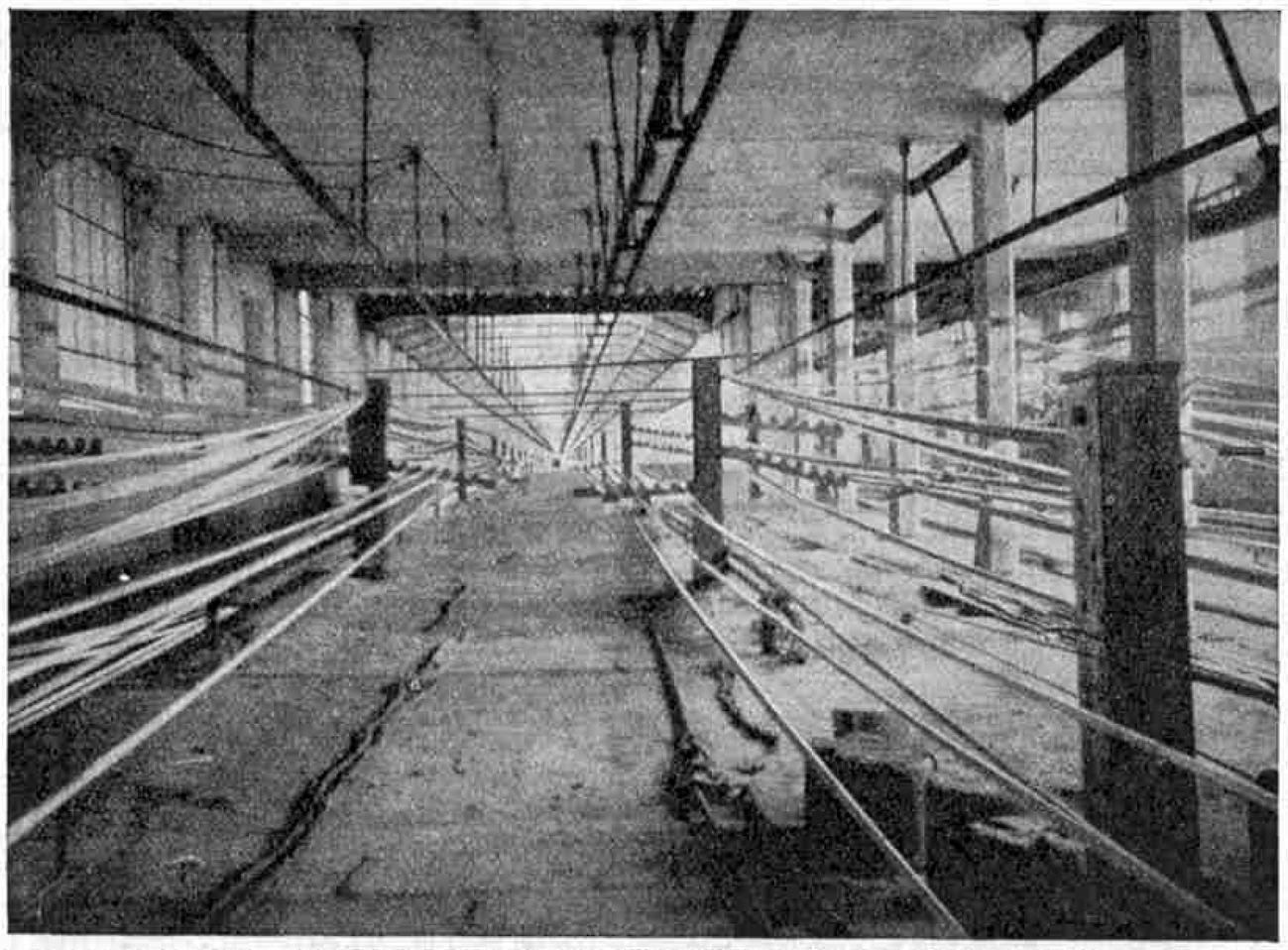
The mountainous nature of the country made an ordinary railway unsuitable.

How Cotton Driving Ropes are Made

Work on a Modern Rope-Walk

ROPE-MAKING is one of the oldest of industries, reaching far back into prehistoric times. Possibly the first ropes were simply the long vines of the forest. Later they were made of the hides of animals, and the art of rope-making began when some early man twisted two or more strands together in order to obtain greater strength.

The Egyptians certainly used ropes, for there are carvings on old monuments showing ropes being spun by hand in a similar manner to that practised to-day in small country rope-walks. The great granite blocks of which the pyramids were built 5,000 years ago were hauled by means of ropes made from palm fibres and papyrus. References to rope-making appear in the Bible, and in verse 12, Chapter 4, of the book of Ecclesiastes we read "A three-fold cord is not quickly broken." In this connection it is singular that although to-day ropes are made of three-ply, four-ply and seven-ply construction for different purposes, a three-ply combination actually is the strongest.



Part of the main rope-walk at the Lambeth Rope Works, of Thomas Hart Ltd., Blackburn, to whom we are indebted for our illustrations and the information in this article.

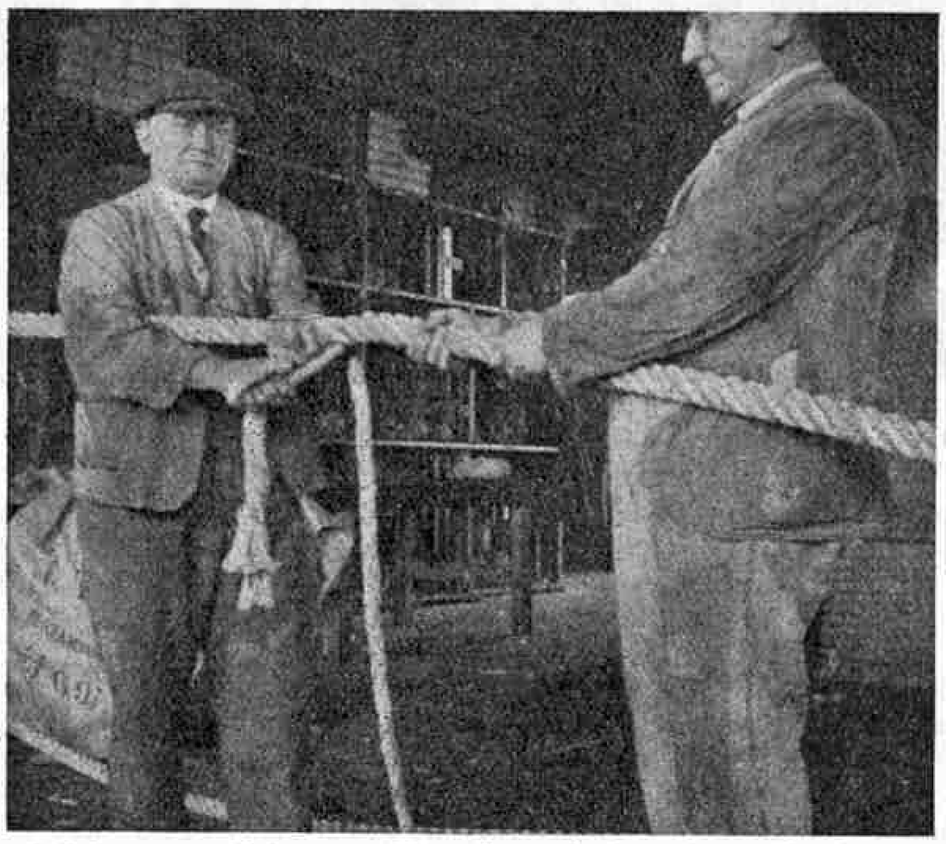
Many different fibres are used in the manufacture of ropes, and wire also is employed, but ropes of this material are outside the scope of this article. Hemp ropes are generally used on ships. These are made chiefly of Manilla hemp, but Italian hemp, sisal and coir fibre also are used. Manilla hemp, or manilla, as it is simply called, comes from the Philippine Islands, and the fibre is obtained from the trunk of the manilla plant, which resembles a banana tree and grows to a height of from 15 ft. to 25 ft.

Sisal is obtained from the leaves of a cactus-like plant from Yucatan in Mexico. These leaves are about 6 ft. long and are cut down every year after the plant is about four years old. The growth of sisal is now being fostered by the British Government in Kenya, and very large portions of the British supplies are being obtained from there. The fibre is lighter in colour than manilla and is being very largely used for twine making. Coir is the fibre of the husk of the coconut.

During the last 70 years ropes of cotton have become very popular. This is largely due to the introduction of power transmission by ropes, for cotton is far more suitable than any other material for this purpose.

In the making of ropes, the fibre is first spun into an even yarn, and this is transformed into rope on the rope-walk. The system employed is the oldest and best, and formerly was carried out by hand, usually in a long narrow shed of wood with a tarred felt roof. At one end of the walk was a spinning wheel to which the spinner attached a few fibres of hemp by means of hooks. The bunch of hemp was placed round the spinner's waist, and as the wheel turned, twisting the fibres into yarns as they were automatically drawn from the bunch, he backed slowly down the walk, regulating the quantity of fibre drawn and spun by the movements of his hands.

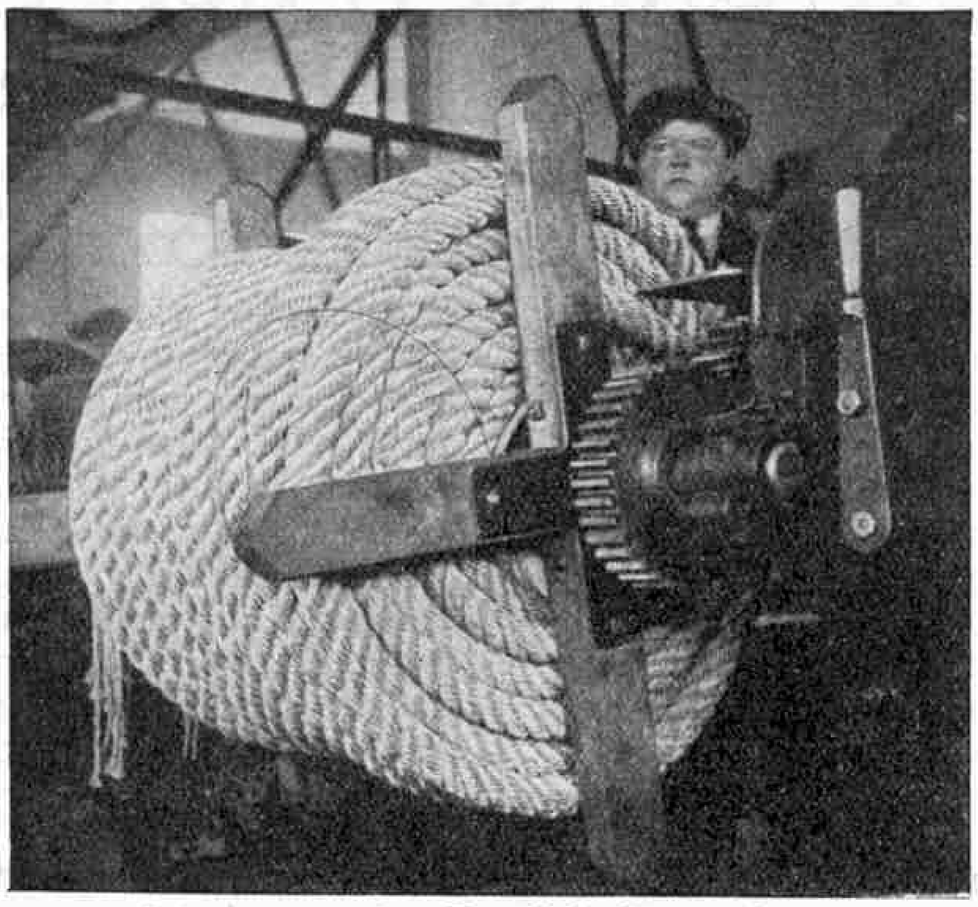
Nowadays rope-making is carried out in factories equipped with intricate and ingenious machines. A modern rope-walk is of immense size. The raw material to be converted into rope on it is first treated in various machines, which clean and straighten the fibre and make it into an endless ribbon or sliver that is reduced by spinning into an even yarn. A sufficient number of yarns are laid out on the walk, and there they are first twisted into strands of the thickness required for the size of rope that is to be made. The strands are then twisted into the finished rope, again on the walk. Ropes of all diameters are made in this manner for different purposes, ranging from $\frac{1}{4}$ in. ropes for use as clothes lines and for similar purposes, up to larger ones 3 in. or even more in diameter.



Splicing cotton driving ropes. The splice used takes 9 ft. to 15 ft. of rope.

Power transmission by ropes has been in vogue about 70 years. For large powers it almost entirely superseded driving by flat belts, one great advantage, especially for textile factories of several

storeys, being that from one flywheel a sufficient number of ropes can be taken to each floor to drive the machinery there. There are some Lancashire cotton mills, with engines of over 2,000 h.p., employing 40 to 50 ropes of say $1\frac{3}{4}$ in. diameter, which is a very common size to use; and in one case 64 ropes were used on the one flywheel.



A large rope on the coiling winch after manufacture.

Rope-driving of course is not confined to textile factories, and steel rolling mills, tin-plate works, flour mills and similar works employ this system on a large scale. It is sufficiently positive for all practical purposes, being superior to a belt in this respect, and in addition is shock-absorbing, thus saving wear on engines, motors and machinery.

In designing a rope drive perhaps the first thing to keep in mind is that the pulleys should be as large as possible, within the limits of the speeds allowable at their rims. The ropes should be of such a diameter that they will bend around the pulleys easily. An old rule, and a good one, is that the diameter of the pulley should be not less than 30 times that of the rope used. This rule need not be taken too literally, however, for no one ratio of rope size to pulley diameter can apply universally.

A rope will bend with less detriment to itself at a slow speed than when it is moving more rapidly. Generally speaking, the larger the pulleys the easier the bending of the rope and the longer its life. Special tables have been prepared to show what may be considered the minimum diameters of pulleys for particular sizes of ropes at various speeds.

What may be called the standard shape of pulley groove has a width and depth respectively of 1 1/12th and $1\frac{1}{2}$ times the diameter of the rope used with it. The pitch is one-third larger than the thickness of the rope, and the angle of the groove is 45 deg., although some engineers use grooves with an angle of 40 deg.

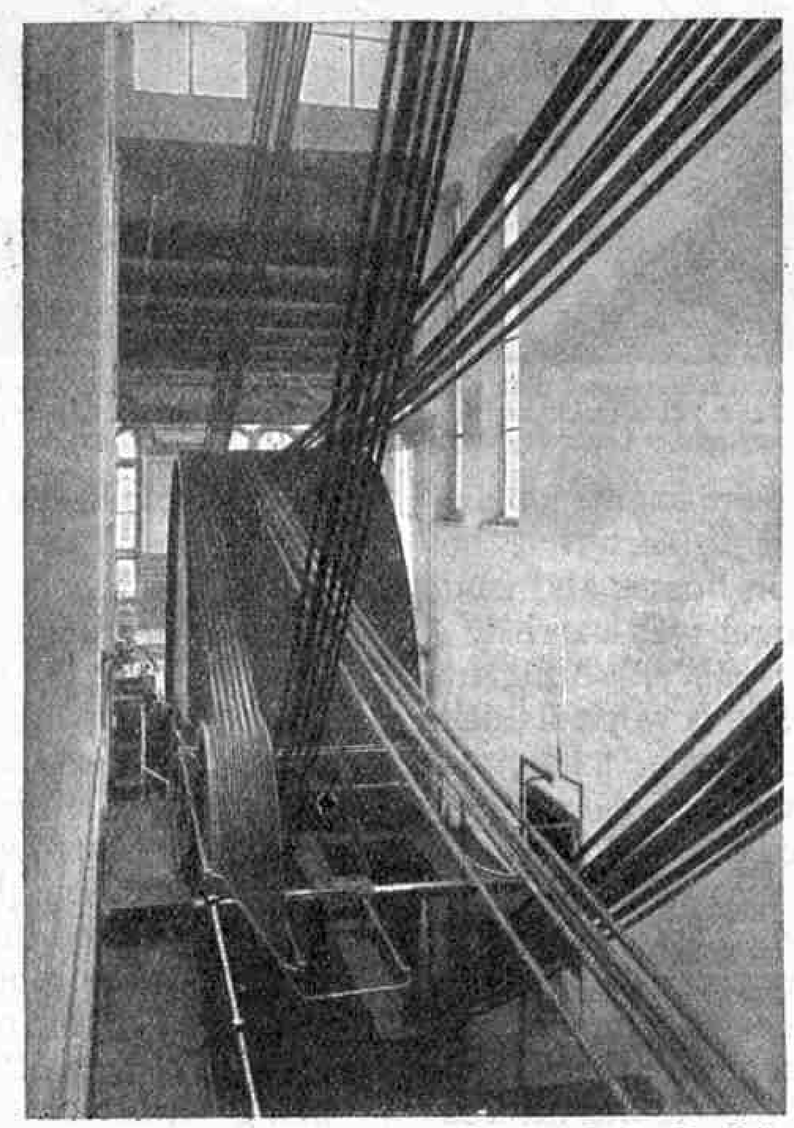
The load that ropes can carry depends primarily on the speed, although the sizes of the pulleys also is a factor. An interesting feature is that it is better to use the ropes with their driving sides at the bottom and their slack sides at the top, for then they are in contact over a greater length of the grooves of the pulleys.

It is very important with a rope drive that there should be no girders, beams, wheels or intervening shafts on which the ropes could touch, for they always run with a sag. Plenty of room should be allowed, for the ropes would soon wear out if they were to touch on obstructions. The usual allowance for sag is about 8 per cent. of the distance between the shafts connected by the ropes. Drives may be either long or short. The pulleys connected may be almost touching, but if they are large enough they may be 80 ft. to 100 ft. apart.

In order to avoid differential driving, in which the ropes do not pull uniformly, it is important that all the ropes of any one drive should be of the same diameter. If the driving and driven pulleys are equal in size, this is not of great importance, but where one pulley is larger than the other, the smaller ropes, sinking deeper into both grooves, attempt to give the driven pulley a slightly different speed than the thicker ropes. Uneven driving and friction are thus introduced.

This point sometimes arises in the mixing of new ropes with old ones. If one or two new ropes are set to work with others that have been in use for some time, where the driver is larger than the driven pulley, the new ones, if thicker, often drag behind the others and carry the slack on the wrong side. The new ones then have to be tightened in order to get them to work evenly with the rest. Where possible it is better to replace all the ropes on a drive at the same time.

Wear in grooves, especially when some are more worn than others, often is a cause of differential driving, and the effect is much greater with a small pulley running at a high speed than with a large pulley working at a correspondingly low speed. This also applies to new pulleys, if all the grooves have not been turned exactly to the same template. Ropes generally run with great steadiness. If any surge, bounce or mounting occurs, the cause usually can be traced to unsteadiness of the engine, shaft, or load.



Cotton ropes at work in a cotton mill. The flywheel is 30 ft. in diameter and from it driving ropes run to different floors.

Rope driving is special work, and suitable construction of the rope used is advisable. It must be reasonably strong, very pliable and, most important of all, must have a low rate of stretch. Cotton is now almost exclusively used for driving ropes because it has a much softer nature and is not so subject to atmospheric influences. In order to obtain pliability a rope must not be too hard in the "lay" or twist. There is no rope that is absolutely stretchless, but this is achieved as nearly as possible in the "Lambeth" design, where the central portion of each strand has practically no twist in it, and is protected by an outer covering of twisted threads that take the friction with the grooved pulleys. This is one of the oldest and best known driving ropes, and is extensively used in all parts of the world. It is made with three or four strands, as some users prefer the one form and some the other.

There is no satisfactory rope coupling for driving ropes, and in order to join them they are spliced with what is known as a "long" splice. This takes 9 ft. to 15 ft. of rope, the length depending upon the thickness, but when finished is no thicker than the main body of the rope. Making a long splice is a job for an expert.

A well-designed rope drive is really a no-trouble drive. The average life of a set of ropes may be given as 10 years, but on some drives it frequently reaches 20 to 30 years.

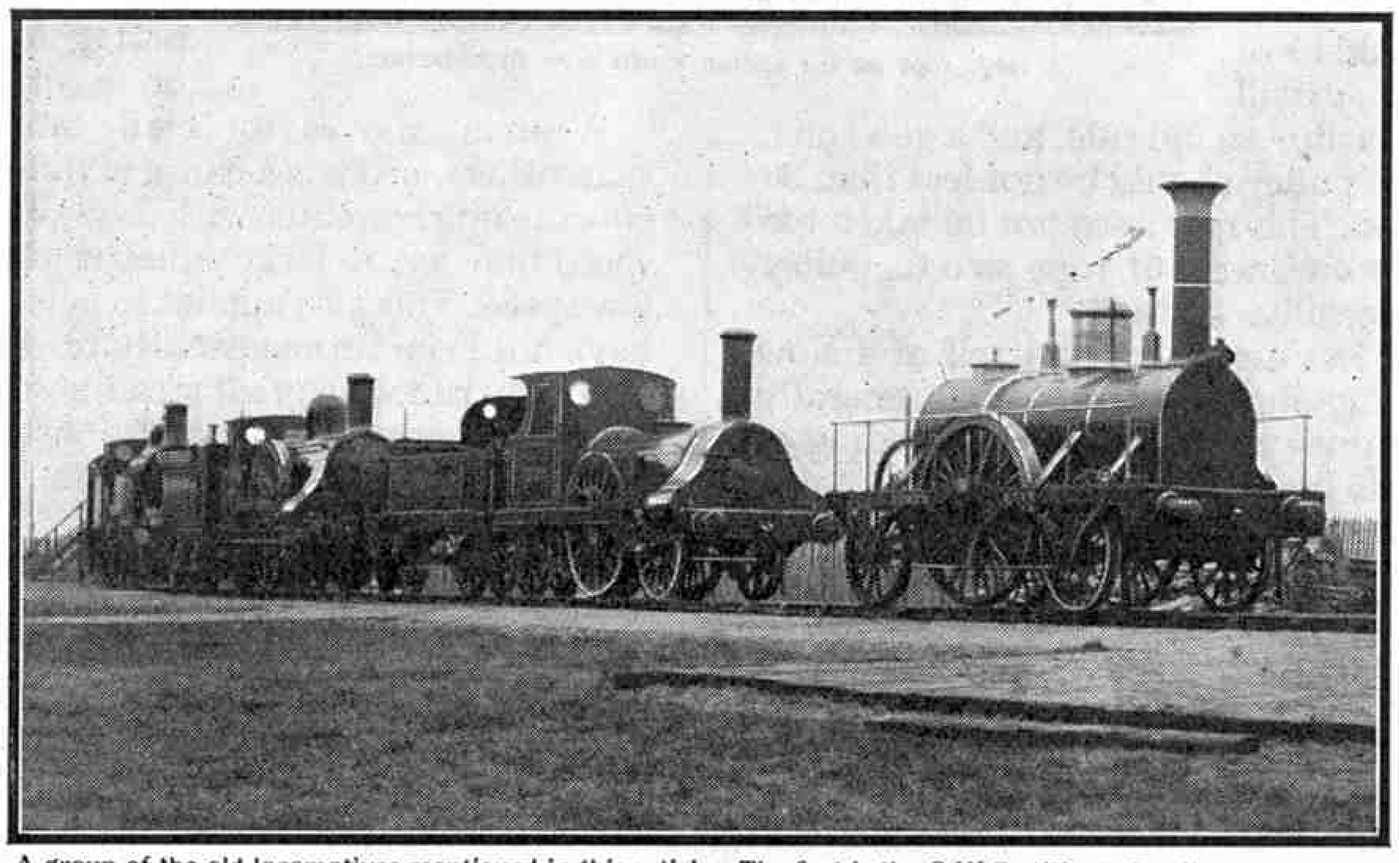
Old Locomotives and Where to See Them

Veteran Engines in Retirement

By R. D. Gauld, M.Eng., A.M.Inst.C.E.

IN the issue of the "*M.M.*" for July last there appeared a description of some of the old locomotives in the Railway Museum, York, which contains the finest collection of railway relics in this country. The present article, which may be regarded as an extension of the previous one, is believed to include all the other old locomotives in the British Isles that are preserved for their historic interest.

Not on account of number, but because of age and historical value, the leading collection of old locomotives is that in the National Science Museum, South Kensington, London. This Museum is open to the public without charge. Of the collection the "*Rocket*" is the most famous member, but unfortunately it is incomplete. This engine was built in 1829 and won the £500 prize awarded by the directors of the Liverpool and Manchester Railway to the best locomotive running in the Rainhill trials of that year. It was purchased by them, and worked on their line till 1836, when it was sold to the Midgeholme Railway, near Carlisle. It ceased running there in 1844, but was not brought to South Kensington until the year 1862.



A group of the old locomotives mentioned in this article. The first is the G.W.R. "North Star"; then come the L.N.W.R. "Columbine" and "Cornwall," and finally the M.R. Johnson single-driver, as exhibited at the Liverpool and Manchester Railway Centenary Celebrations in 1930. Photograph by courtesy of the L.M.S.R.

A replica of the "*Rocket*" showing what the original complete engine looked like is on view. From the descriptive label we learn that the driving wheels were of oak with cast iron bosses and iron tyres, and that a 300-gallon water barrel was carried.

Another famous exhibit is "*Puffing Billy*," built at Wylam Colliery in 1813 by William Hedley. It worked until 1862 between the colliery and the River Tyne. It has two vertical cylinders driving four wheels through a series of rods and gear wheels. The engine weighed 8.3 tons in working order, and usually hauled about 50 tons at 5 m.p.h. The four-wheeled tender weighed 4.3 tons when loaded. Owing to the weakness of the cast iron plateway track on which it ran, the engine was rebuilt in 1815 with eight wheels, each group of four wheels being carried in a separate truck, and two more gear wheels were used. About 1830 it was altered back to four wheels, the line being at that time relaid with cast iron edge rails, on a short length of which the engine now stands.

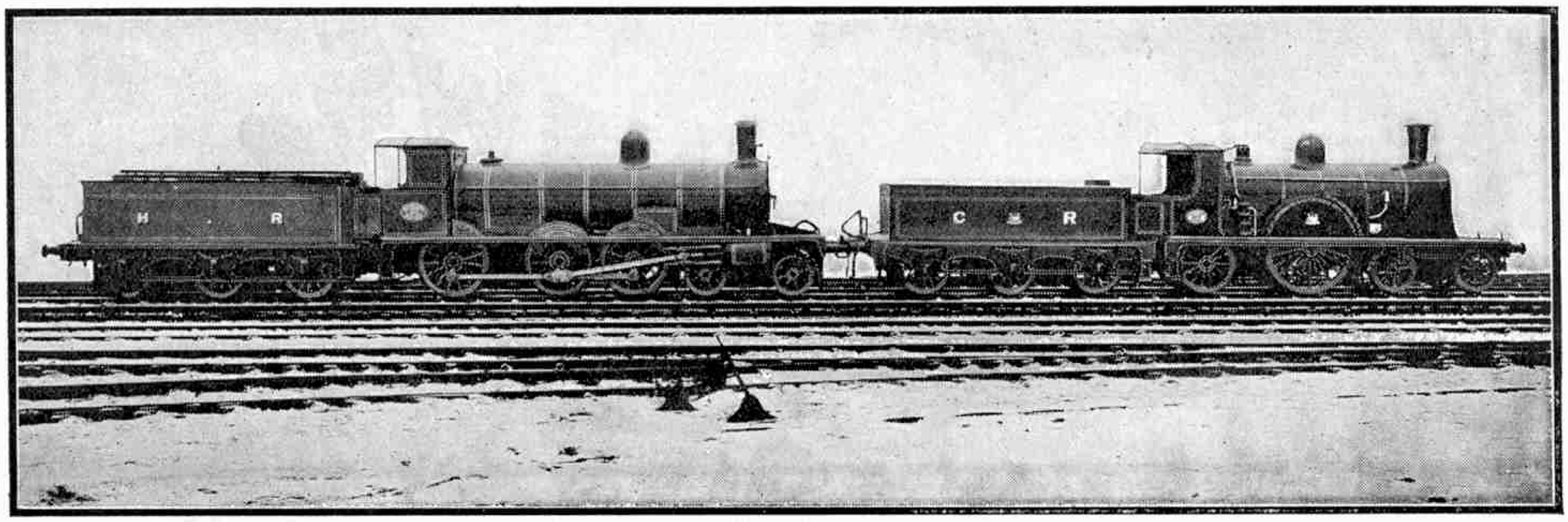
The "*Sans Pareil*" ("without equal") was built in 1829 by Timothy Hackworth for entry in the Rainhill trials. It was afterwards bought by the directors of the Liverpool and Manchester Railway and used until 1831, when it was transferred to the Bolton and Leigh line. In 1837 the wood-spoked wheels were replaced by cast iron wheels. In 1844 it was removed to Coppull Colliery, near Chorley, and used to drive pumping machinery. At this duty it worked until 1863, when it was remodelled as a locomotive, and presented to the Museum. There are four coupled wheels with two vertical cylinders.

The "*Novelty*," by Braithwaite and Ericsson, which also competed at Rainhill, has been reconstructed, as parts were missing. After a short period on the Liverpool and Manchester line this engine went to the Longridge and Preston Railway. A peculiar feature of it is the closed ashpan, into which air was forced by a bellows worked off a bell crank. There are four wheels, and two vertical cylinders, but the wheels are not coupled. The exhaust was direct into the air, not up the chimney; and in working order the engine weighed just under 4 tons.

Leaving the Museum, we may now note individual engines that are to be found in various places. There is "*Lion*," now established on a pedestal in Lime Street Station, Liverpool. This engine, which is of the 0–4–2 type, was built for the Liverpool and Manchester Railway by Tod, Kitson and Laird, of Leeds, in 1838. After four years' service it was sold to the Mersey Docks and Harbour Board for £400, and for 70 years was used for driving a set of pumps at the Princes Dock, Liverpool. It was fixed on trestles, the coupling rods being taken off and the driving wheels used as flywheels. It was recovered and restored as a locomotive for the Centenary celebrations of the Liverpool and Manchester Railway in 1930.

Outside Barrow-in-Furness station is an elaborate ornamental iron and glass pavilion, in which is housed "*Copper Nob*," so called because of its polished copper-domed firebox. It was numbered 3, and built by the celebrated Bury, an early builder of many locomotives. It was first run in 1846, and saw 52 years' service on the Furness Railway, being withdrawn in 1898.

In Dane John Gardens, Canterbury, "*Invicta*" is mounted in a small railed enclosure. This locomotive was built by Robert Stephenson in 1830 for the Canterbury and Whitstable Railway. It has been altered at various times, and for a period was housed in Ashford Works. There are four coupled wheels, and the boiler was originally similar to that of the "*Rocket*," with fire tubes, but was afterwards replaced by a boiler with a single flue tube.



In the Scottish National Museum, Edinburgh, is preserved Hedley locomotive No. 2, very similar in appearance to "*Puffing Billy*." The engine has eight wheels, driven by gearing, with vertical cylinders, and an arrangement of overhead rocking levers.

The L.N.E.R. station at Bank Top, Darlington, contains the famous engine "*Locomotion No. 1*," built by George Stephenson in 1825. It had a fairly short life, as it ceased running in 1846. There are two vertical cylinders and four wheels, coupled together; the original weight was 7 tons. It is estimated to have developed 10 h.p., and it used to haul a load of 60 to 70 tons at 5 m.p.h. The tender is of wood, on four cast iron wheels, and held 15 cwt. of coal and 240 gallons of water. Engine and tender together weighed in working order, 10 tons.

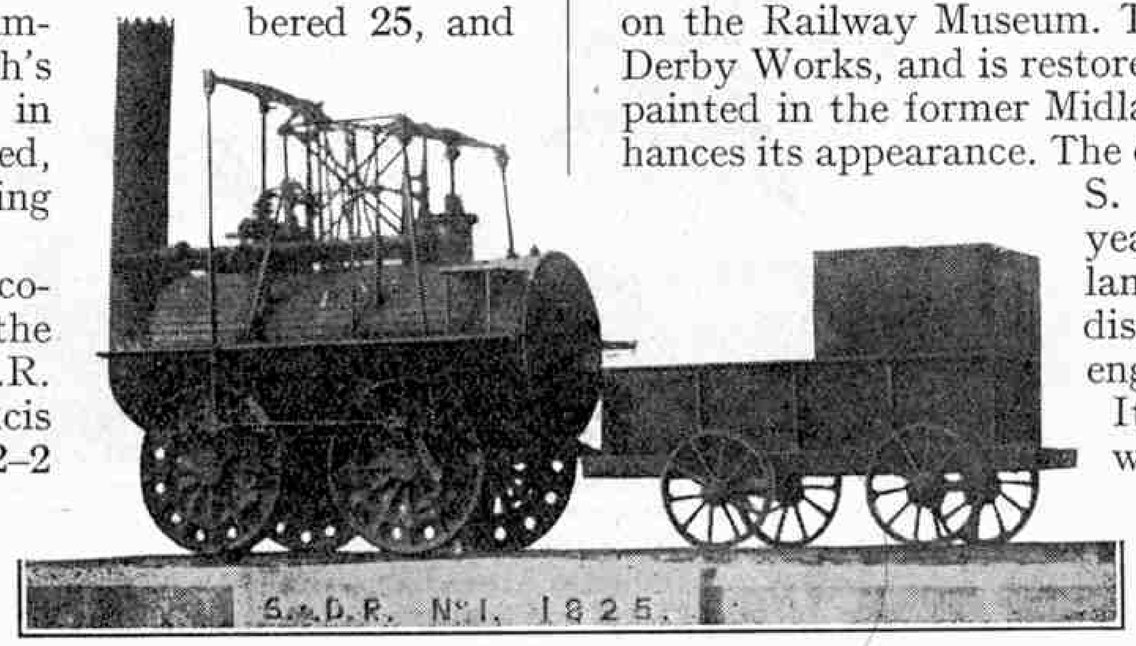
Next on the list is the engine preserved by the L.N.E.R. in their station at Newcastle. This is the locomotive called "*Derwent*," numbered 25, and built to Timothy Hackworth's design by Alfred Kitching in 1845. It has six wheels coupled, and inclined cylinders driving forward.

Two very interesting locomotives are preserved at the Crewe Works of the L.M.S.R. "*Cornwall*," built by Francis Trevithick in 1847, has the 2–2–2 wheel arrangement, and the driving wheels are 8 ft. 6 in. in diameter with openwork splashers. On her trials this engine attained a speed of 79 miles per hour. She was rebuilt in 1858, and from then until the end of December 1905 she ran 928,838 miles. From November 1890 until May 1902 "*Cornwall*" worked the 40-minute expresses between Liverpool and Manchester.

The other locomotive preserved at Crewe is "*Hardwicke*," of the famous "Precedent" class built by F. W. Webb. These engines were fitted with Allan's link motion, and "*Charles Dickens*" of the same class ran well over two million miles in 26 years. "*Hardwicke*" gained fame by taking part in the "Race to Aberdeen" in 1895. On the last day of the race, 22nd August, this locomotive took the West Coast train of 70½ tons from Crewe to Carlisle at an average speed of 67.2 miles per hour, thus materially helping this train to win the race.

At the Swindon Works of the G.W.R. is housed "*North Star*," built in 1837, and reassembled for exhibition purposes in 1925. This engine was made for the original broad gauge track of the G.W.R., and the single pair of driving wheels are 7 ft. in diameter. The builders were R. Stephenson and Co. and the locomotive started work in June 1838, when the line was opened to Maidenhead. It remained at work for 32 years, during which a mileage of 429,000 was run.

At one time most of the fastest trains in this country were hauled by the class of engine known as the "single drivers," because the whole of the tractive effort was exerted through one pair of driving wheels. This arrangement gives the minimum of internal friction, and as the wheels could be made very large, it is not surprising to learn that these engines were noted for very fast running. The Great Northern and Midland designs were probably the most notable, and one of each has been preserved for the admiration of future generations of railwaymen. The Great Northern one is at York, as described in the earlier article on the Railway Museum. The Midland engine is kept at Derby Works, and is restored to its original condition and painted in the former Midland colours, which greatly enhances its appearance. The designer of the locomotive was S. W. Johnson, who for many years was responsible for the Midland motive power and did much distinctive work. This particular engine was built at Derby in 1900. It has steam sanding gear. This was somewhat of a novelty in 1900, but as slipping was the main fault with single drivers when hauling loads that taxed their powers, a reliable supply of sand under the wheels was very important.



The upper illustration shows the C.R. 4-2-2 and the H.R. 4-6-0 locomotives that are preserved at the St. Rollox Works of the L.M.S.R. in Glasgow. "Locomotion No. 1" of the Stockton and Darlington Railway appears in the lower photograph, which is reproduced by courtesy of the L.N.E.R.

Early in 1936 the L.M.S.R. decided to save two notable engines from the scrap heap, and these have now found a home in the St. Rollox Works, of the former Caledonian Railway. One of these is the Caledonian engine numbered 123, of the single-driver type and the last of this pattern to be used on passenger services in Great Britain. It was running in Scotland up till 1935, and completed a total mileage of about 780,000. The engine was built by Neilson and Co. of Glasgow in 1886, and was bought by the Caledonian Railway after it had been shown at the Edinburgh Exhibition. It took part in the "Race to Edinburgh," between the East and West Coast Routes.

The other locomotive at St. Rollox was formerly Highland Railway engine No. 103, and is notable for being the first 4–6–0 engine to be built for service in Great Britain. It was designed by Mr. David Jones, for working on the heavy gradients of the Highland line.

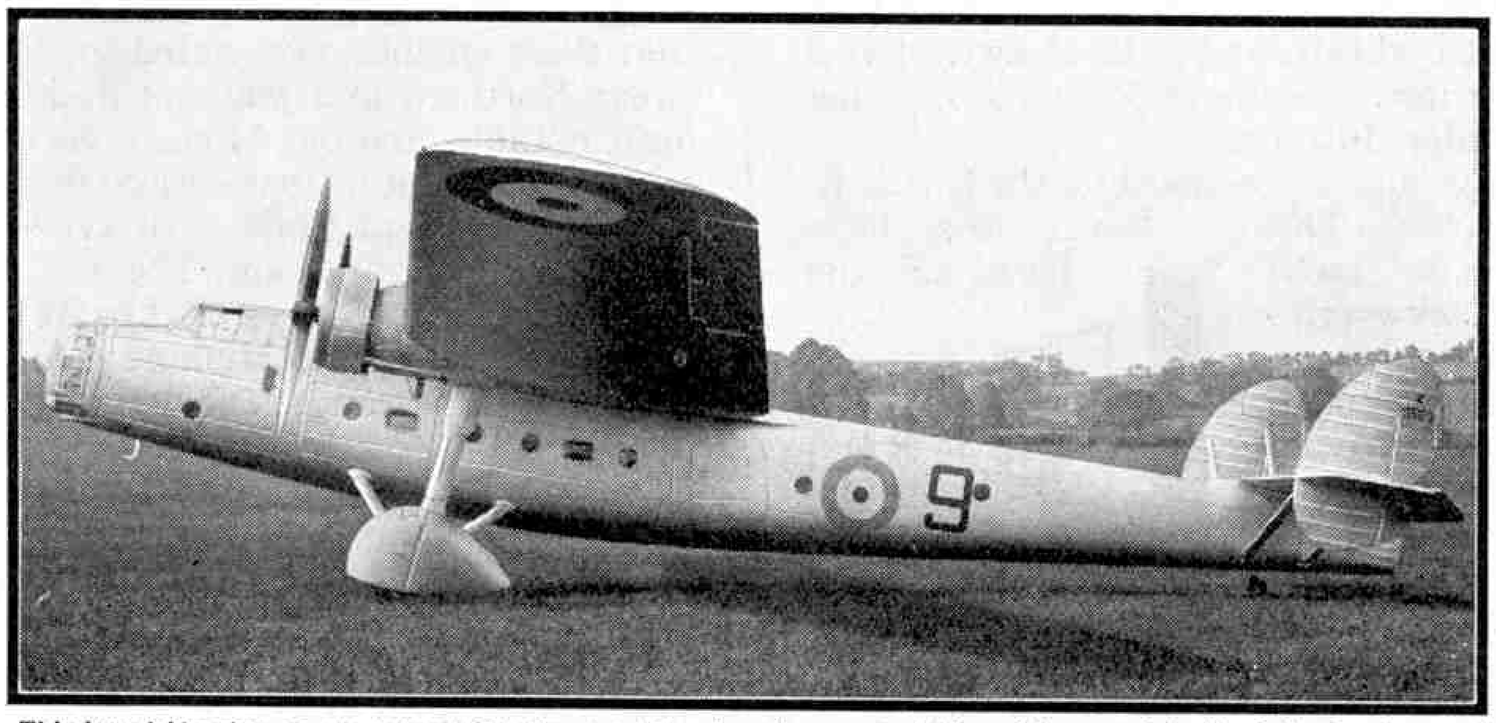
Portsmouth-Johannesburg Air Race

The air race to Johannesburg, South Africa, promoted by Mr. I. W. Schlesinger as an item in the celebrations of the Jubilee of Johannesburg, was won by Mr. C. W. A. Scott and his companion, Mr. G. Guthrie. They covered the 6,150 miles in 52 hr. 56 min. 48.2 sec., at an average speed of 116 m.p.h., and set up a new record for a flight from this country to South Africa. By this fine flight they won the Schlesinger Cup and the first prize, £4,000.

Mr. Scott is well-known as the winner, along with the late Mr. T. Campbell Black of the England-Australia air race in 1934, and he now has the distinction of having flown from England to both Australia and to South Africa faster than any other airman. Scott and Guthrie flew one of the two Percival "Vega Gull" low wing monoplanes that took part in the race. The other was flown by Major A. M. Miller, who withdrew after getting as far as Belgrade.

Until a late stage in the race the lead was held by Captain S. S. Halse, flying a Percival "Mew Gull," but he crashed when only about 680 miles from the finishing point. Unfortunately the largest machine taking part, an Airspeed "Envoy," crashed when taking off from Abercorn, in Northern Rhodesia, and two of the four occupants, Captain M. Findlay and Mr. A. H. Morgan, the wireless operator, were killed. The disaster probably would not have occurred but for the fact that shortly after the airmen landed at Abercorn to refuel the wind changed, and it became necessary for them to take off in a direction that involved an uphill run across the aerodrome. The airmen were advised not to attempt the difficult take-off, but did so in the hope of overtaking Captain Halse, then the only competitor ahead of them. The "Envoy" got off the ground, but failed to clear a belt of trees bordering the aerodrome.

As none of the other competitors in the race succeeded in reaching Johannesburg before the time limit expired, the £6,000 provided by Mr. Schlesinger for second and third prizes is to be divided between the dependants of the two airmen who were killed.



This broadside view of the Bristol 130 Transport-Bomber gives a good idea of the great depth of the fuselage and breadth of the wings. When used as a troop carrier the machine can convey 24 soldiers with complete equipment. Photograph by courtesy of The Bristol Aeroplane Co. Ltd.

Wireless and the New Empire Air Scheme

Many important developments and improvements are taking place in wireless communication, as part of the improved ground organisation for the big new Empire air scheme to be brought into operation next year, and about 20 new wireless stations are now being erected at various points along the Empire air routes. The wireless equipment being fitted in the new Empire flying boats is the most modern and efficient ever constructed for use in commercial aircraft.

These important developments make it necessary for Imperial Airways to increase their highly-skilled wireless personnel. In addition to pilots entering the company's service and studying at the instructional school to obtain their official certificates in wireless, specially-chosen operators are being drafted from the marine service into that of the air. They are being given additional and specialised coaching to enable them to pass their examinations for obtaining, as air-liner wireless operators, the aviation equivalent of the official certificate held by wireless operators on ships. A special article describing the work of Imperial Airways' school will appear in next month's *"M.M."*

"Hindenburg" to Carry More Passengers

The regular trans-Atlantic airship service maintained by the *"Graf Zeppelin"* and the *"Hindenburg"* has become so popular that the passenger accommodation of the *"Hindenburg"* is to be increased by the addition of 10 more double cabins and two single ones. The airship will then be able to carry 72 passengers. The service is not operated during the winter.

Winter Air Services

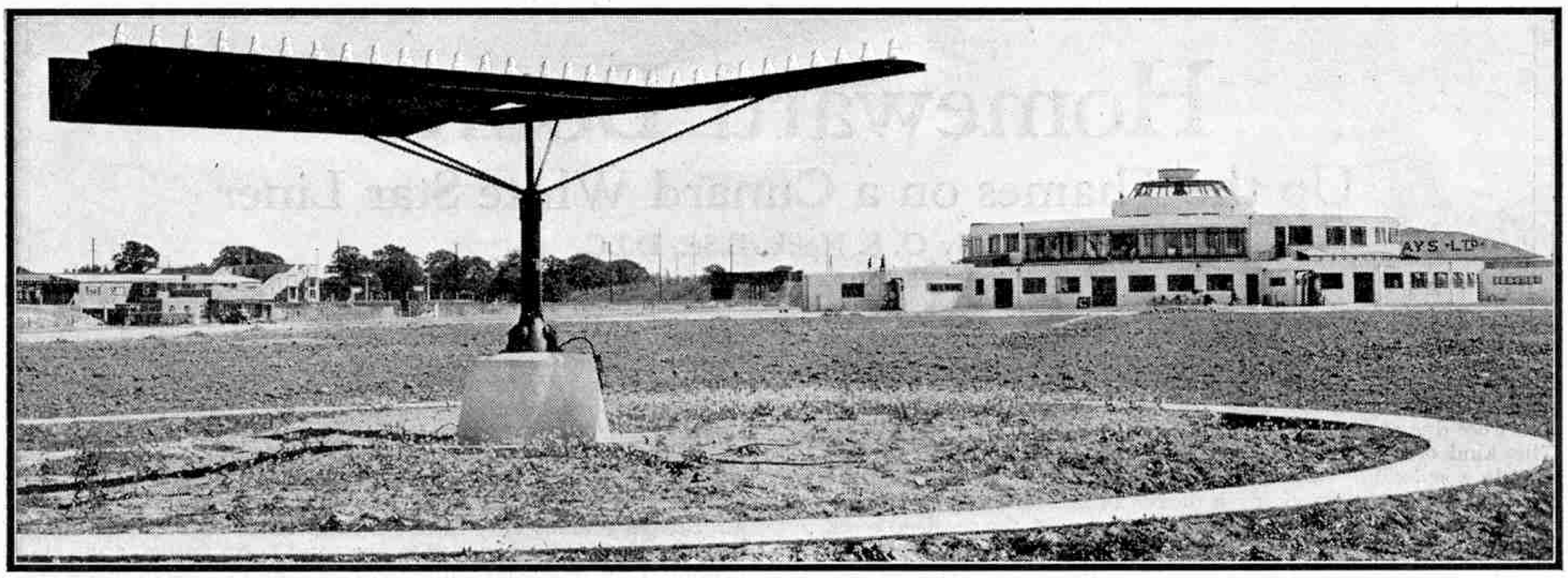
Internal air services that are being continued throughout the winter include the Croydon-Glasgow and the Isle of Man lines of Railway Air Services. The Croydon-Glasgow trip is flown daily, the aeroplane leaving Croydon at 9.30 a.m. and reaching Glasgow at 1.40 p.m. In the reverse direction the aeroplane leaves Glasgow at 7.50 a.m. and arrives at Croydon at noon. The trip between Liverpool and the Isle of Man is made twice daily on weekdays and once on Sundays.

A thrice-weekly service between Belfast and Carlisle also is being operated by Blackpool and West Coast Air Services Ltd.

There have been seasonal reductions in the air services to and from Europe. Swissair are continuing their daily London-Zurich service. but only on weekdays, although the trip will be made on Sundays during the winter sporting season. The flight takes just under four hours. During the autumn and winter the Amsterdam-Batavia service of K.L.M. is a twice-weekly one, the aircraft leaving Amsterdam on Wednesdays and Saturdays, and departing from Bandoeng, the Batavia termini, on Mondays and Thursdays. The outward trip takes 6½ days and the return only 6 days.

Monospars for Canadian Air Service

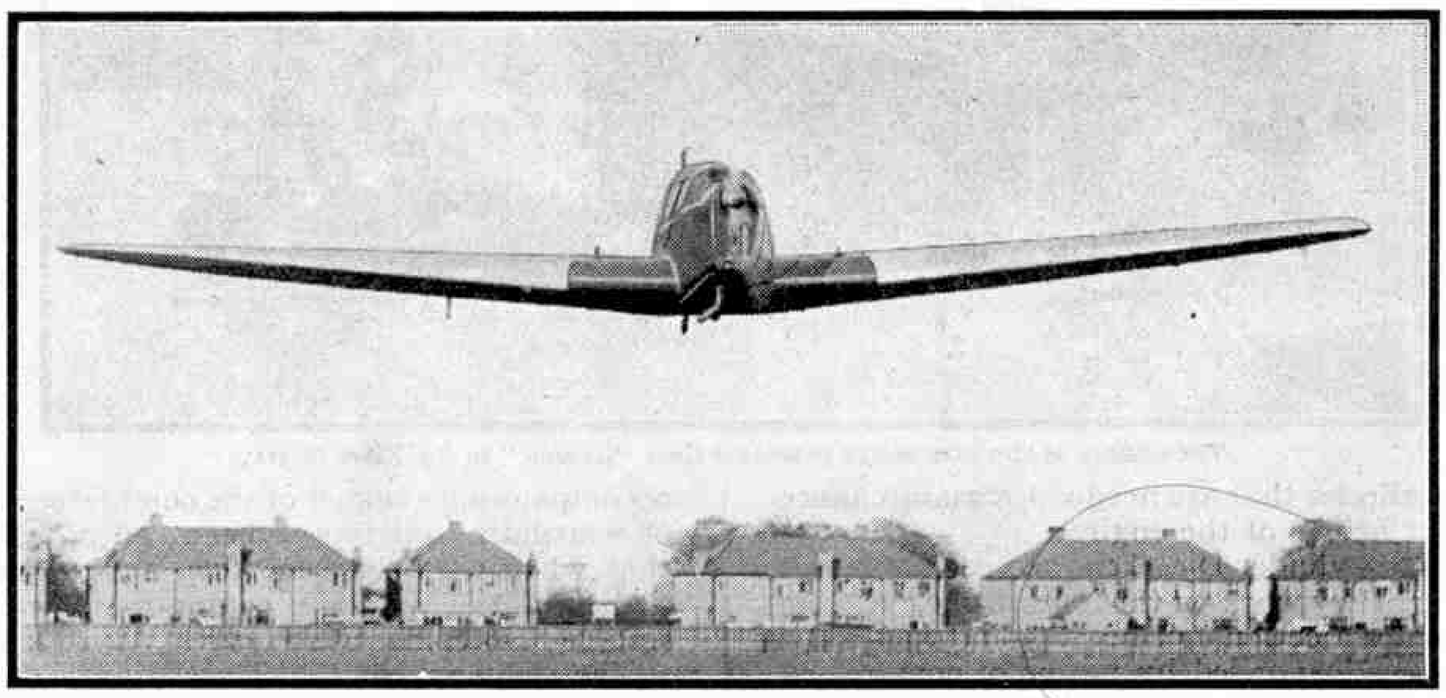
Five Monospar S.T.25 aeroplanes have been built for Eastern Canada Air Lines Ltd., and will be employed on a twice-daily circuit of the Maritime Provinces. These twin-engined low wing monoplanes are fitted with Pobjoy "Niagara III" engines, and have a cruising speed of about 130 m.p.h. The five machines built for Canada have specially strengthened floors and cabin sides, as they will be used chiefly for freight transport, but they can easily be fitted with seating accommodation if required for passenger flights. The aircraft have been named after the principal Canadian cities on the Atlantic coast, and before being despatched from England were christened at Hanworth aerodrome by Lady Shelmerdine, wife of the Director-General of Civil Aviation.



G.E.C. Wind Direction Indicator

One of the most important features of the lighting equipment of a modern airport is the illuminated indicator designed to show pilots the direction of the wind, by day and night. The upper illustration on this page shows the G.E.C. illuminated wind direction indicator installed at Gatwick Airport. It consists of a "T" shaped metal framework 20 ft. in length, with a 20 ft. crosspiece, the whole framework mounted at its centre of gravity on a pivot and further supported by means of compression struts. The pivot is constructed of steel tube and is fitted with enclosed heavy duty ball bearings and thrust races. The apparatus is operated by the direct action of the wind on a streamlined vane fixed to the tail of the indicator. The upper surface of the "T" shaped framework is covered with sheet metal and is painted white, and the remainder of the indicator is finished black.

At night the indicator is brilliantly lit by 40 15-watt Osram lamps, which are mounted along the upper surface of the "T" shaped framework, and are protected by weatherproof cover glasses.



The upper illustration is of the G.E.C. illuminated wind direction indicator at Gatwick Airport, and is reproduced by courtesy of the General Electric Co. Ltd. The lower photograph shows a B.A. "Eagle" in flight, with the undercarriage retracted. Photograph by courtesy of "The Aeroplane."

Trans-Pacific Air Service

Pan-American Airways have organised a regular passenger air service between San Francisco and Manila. Martin flying boats are being used, and stops are made at Honolulu, Midway Island, Wake Island and Guam. The total distance is 8,200 miles, and it is covered in six days, including a 24-hr. stay at Honolulu.

More Aircraft for Netherlands Navy

The Dutch Government have ordered six triple-engined Dornier aeroplanes for the Netherlands Navy. They will be used for the defence of the Netherlands East Indies. When the builders have completed these machines a further order for 36 aircraft will be given to them. Half of this number will be produced at the Dornier factory and the remainder will be built in Holland under licence.

Iraq Internal Air Services

An important step toward the development of internal air services in Iraq was taken recently, when the Iraqi Economic Council decided to form an air transport company. The regular air services it is proposed to operate will link up the chief towns in Iraq, and will also give communication by air between Baghdad and important towns on the Mediterranean coast. The scheme also includes the establishing of a flying school for the training of commercial air pilots.

Growth of Air Transport in Canada

In 1924 there were only 39 licensed aeroplanes in Canada, and only a little over 500,000 lb. of freight was carried by air in that country. By last year the total of licensed aircraft had increased to almost 400, and the quantity of freight carried in 1935 was over 25,000,000 lb. In the same 10 years the amount of air mail dealt with annually increased from 1,080 lb. to 1,126,084 lb.

Commercial air transport has proved of great value to Canadian mining, and in connection with the Canadian fisheries. Civil aircraft are also being used increasingly for aerial survey work.

New Italian Military Aerodrome

An important military aerodrome has been constructed at Forli, an Italian town near the Adriatic coast. It covers an area of about 296 acres, and the preparation of the site involved the demolition of four villages and some woods, and the levelling of several hills. The extensive equipment of the aerodrome includes air raid shelters, and underground fuel and oil tanks sufficiently large to hold several month's supply of those commodities. The aerodrome was officially opened by Signor Mussolini, who is a native of Forli, and striking formation flights and demonstrations were then carried out by 250 aircraft of the Aquila Air Division of the Italian Air Force.

Second Empire Flying Boat Launched

"Caledonia," the second of the Empire flying boats under construction by the Short company, was launched recently at the maker's works at Rochester. It immediately made a preliminary test flight lasting about 30 min., during which time it circled over the town. It was piloted by Captain A. L. Parker, a test pilot of the company, who was accompanied by a crew of six. Other necessary test flights have been carried out since.

The *"Caledonia"* has been fitted with extra fuel tanks in the wings, as it will be used early next year for long-distance test flights to obtain technical information in connection with the proposed North Atlantic air service.

British Air Transport Record

An Imperial Airways liner *"Danae"* has set up a new British air transport record by covering 2,070 miles in one day. This air liner is in service on the London-Marseilles-Brindisi route, and on a recent outward journey from Croydon was delayed overnight by bad weather at Marseilles. The following morning the pilot, Captain E. R. D. White, who was accompanied by an assistant pilot and wireless operator, flew on to Brindisi, where a load of mails was picked up. Making a quick turn-about he arrived back at Croydon shortly before midnight on the same day. The 2,070 miles were covered in 18 hrs., in spite of five halts for re-fuelling and freight purposes.

"Danae" is one of the company's "Diana" class air liners, and is fitted with four D.H. "Gipsy Six" engines.

Homeward Bound

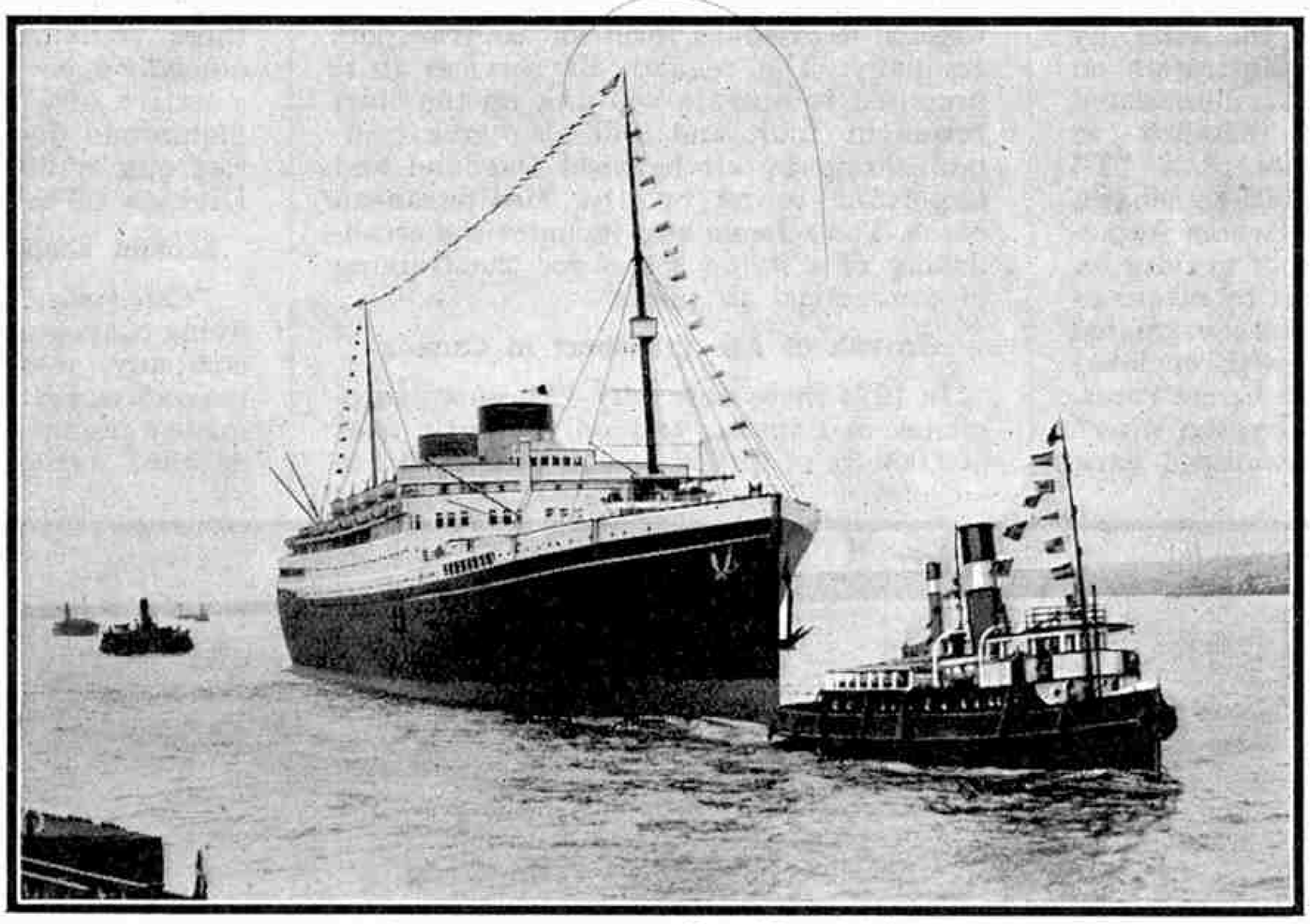
Up the Thames on a Cunard White Star Liner

By O. S. Nock, B.Sc., D.I.C.

THE *"Georgic"* rode a calm sea. But for an occasional quiver, the distant purr of the engines, and the swish of the waves, I might have been sitting in the lounge of a hotel, so smooth was our progress. We were in mid-Channel, homeward bound from New York, and were due at Havre in a few hours. I went into the Palm Court. This kind of forward lounge is just beneath the bridge and commands a splendid view of the sea ahead; the superstructure is rounded at the front, giving a degree of streamlining and a very pleasing effect from inside. The sky was overcast, the sea deep green, and right ahead the French coast showed up as a grey line.

The *"Georgic"* and her sister ship the *"Britannic"* operate what is known as the "intermediate" service to America, as distinct from the "express" service worked by the *"Queen Mary," "Aquitania"* and *"Berengaria."* They sail from London, and call at Southampton and Queenstown in addition to Havre. As their names show, these vessels belonged to the White Star Line—indeed they still carry the old colours, buff funnels with a black band at the top; they are magnificently appointed and are among the most popular ships on the North Atlantic.

The *"Georgic"* is a motorship of 27,760 tons, built as recently as 1932 by Harland and Wolff's at Belfast; she is designed for moderate speed and makes the crossing from New York to Queenstown in a week. Her normal speed is about 18 knots. An hour before we were due at Havre I met Mr. Horsburgh, the Chief Engineer, who took me down to the engine room to watch the ship being manœuvred into port. We went down by an electric lift, in a cage just big enough to take three men, and as we neared the bottom passed several galleries that are needed for maintenance purposes owing to the great height of the engines.



The Cunard White Star motor passenger liner "Georgic" in the River Mersey.

The ship is driven by two 10-cylinder Diesel engines each of which develops 10,000 horse power. They work on the four-stroke cycle, on what is known as the "solid injection" principle. The fuel oil is sprayed into the cylinders and vaporised by means of compressed air, the "blast air" they call it, at a pressure of 800 lb. per sq. in. The cylinders are 33⅜ in. in diameter with a stroke of no less than 5 ft. 3 in.; and the propeller shafts, which are coupled direct to the engines, make only 98 revolutions per minute when going full speed.

When we got down to the control platform both engines were going full speed ahead, but the warning signal had been given from the bridge and the engineers were standing by ready for any changes that might be wanted. Each engine is in two halves, there being two 5-cylinder units; each half of the engine is controlled separately but the regulating levers are placed close together so that both can be operated simultaneously by one man. The telegraph signal dials are placed close to the regulating levers, near the middle of each engine.

Soon the telegraph rang indicating half speed; we were slowing up to take a French pilot on board to get us into Havre. Signals now followed rapidly, and two visual revolution indicators were switched on to show the actual movement of each propeller shaft. These devices consist of a ring of electric lamps behind a frosted dial. As the shafts revolve the lamps are lighted consecutively, and give the impression of a point of light travelling round and round in a circle. The engines are entirely encased, and the engineers on the control platform have no means of seeing exactly when the shafts have ceased to revolve. If the valve gear were to be reversed and an attempt made to restart the engine before it had completely stopped, the result would be some terrific back-firing.

The engines are restarted by compressed air. The regulating levers are moved to a particular notch on the quadrant plate; then with a sharp hissing the engines start, and as soon as each has made one complete revolution, as indicated on the dial, the levers are moved still further over and full Diesel working begins. Four 800-h.p. Diesel engines are provided to drive the compressors that supply the blast air, though actually only three are used. These three engines should strictly speaking be included in the total horse power of the ship, making it up to 22,400, but even this is quite a small figure considering the size of the *"Georgic."* But here again it is entirely a question of speed. Only 22,400 h.p. are needed to drive a ship of 27,760 tons at 18 knots, compared with the 16,000 h.p. required to take the 3,470-ton Irish Mail boats from Holyhead to Dun Laoghaire at a top speed of 25 knots. The difference seems incredible! Then, in addition to the air compressors, the auxiliary Diesel engines drive four 500-kilowatt generators for supplying electricity through the ship. As the Chief Engineer expressed it, they generate sufficient power for a town of 30,000 inhabitants.

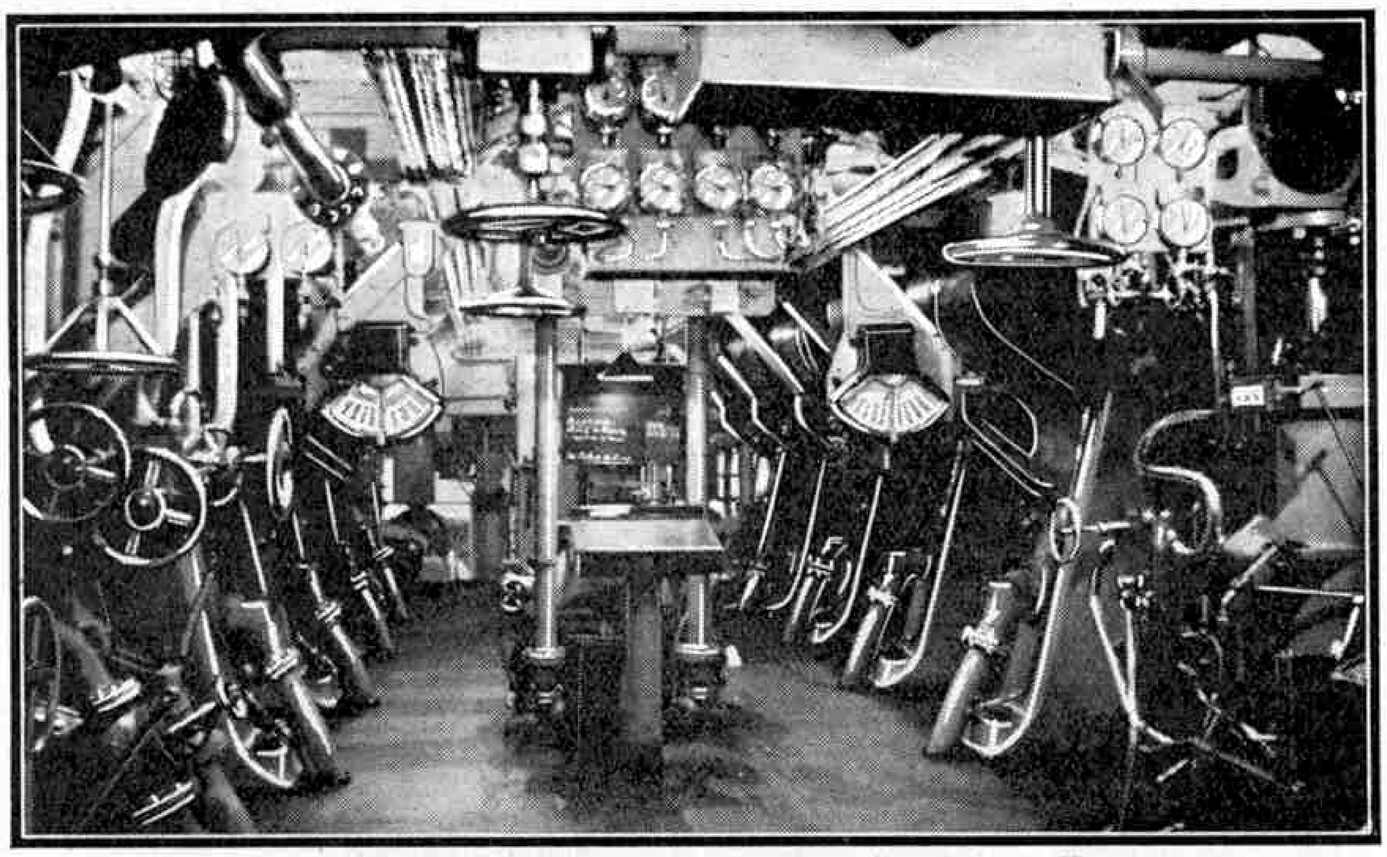
Now both engines were stopped; for a moment all was quiet, and then, full speed ahead on both engines. The pilot was on board. As we manœuvred up to the berth, with tugs assisting of course, I tried to visualise the scene above; often the two engines were running in opposite directions, while the ship was being swung. Both were stopped, severally, to be restarted with the loud accompanying exhaust of the compressed air. In the upward current of ventilating air it was beautifully cool; Mr. Horsburgh told me that when they were in New York during the terrific heat-wave earlier in the year the engine-room was the coolest part of the ship! So we came into Havre.

The quay where the Transatlantic liners berth is remarkably equipped. A ship is moored against a number of buttresses so that it is kept six feet or more from the quayside, and instead of the usual type of gangway a sliding bridge is run across from an elevated gallery so that passengers go ashore from the promenade deck of the liner. Cargo is unloaded very quickly by powerful travelling cranes. One of the big C.G.T. liners, the *"Paris,"* was berthed just astern of us, and three tugs, two at the bow and one at the stern, were waiting ready to help us off. Our stay at Havre was brief indeed; at 6.25 p.m., barely 40 minutes after we had berthed, the gangways were withdrawn. During this brief time the customs and immigration formalities had been carried out for a hundred or more passengers, and cargo unloaded.

While we were in Havre I was introduced to Captain Townley. He told me that he expected to be off Dungeness about 1 a.m., and that there the Channel pilot, Mr. Anderson, would take over. The Thames estuary requires very skilful navigation and a most intimate knowledge of the currents, the difficulties beginning as far out as the Straits of Dover. I should explain that in such cases, although the pilot sets the courses and gives all the necessary orders for navigation, he never takes full charge of the ship; he is the local expert taken on board to advise, but he is in all things responsible to the Captain. It is just the same in the case of the harbour pilots

taken at Havre, Southampton, and Queenstown.

Now, the two tugs at the bow were pulling away at right angles to the length of the ship; belching smoke and churning the water into a welter of foam they fully earned the description "fussy," which is so often applied to their kind. The one at the stern was hauling too, and soon we were well clear of the quay; then the steel hawsers were cast off and two of the tugs steamed away to the opposite side of the dock. The third went careering out to sea in front of us ready to lend a hand when we dropped the pilot.

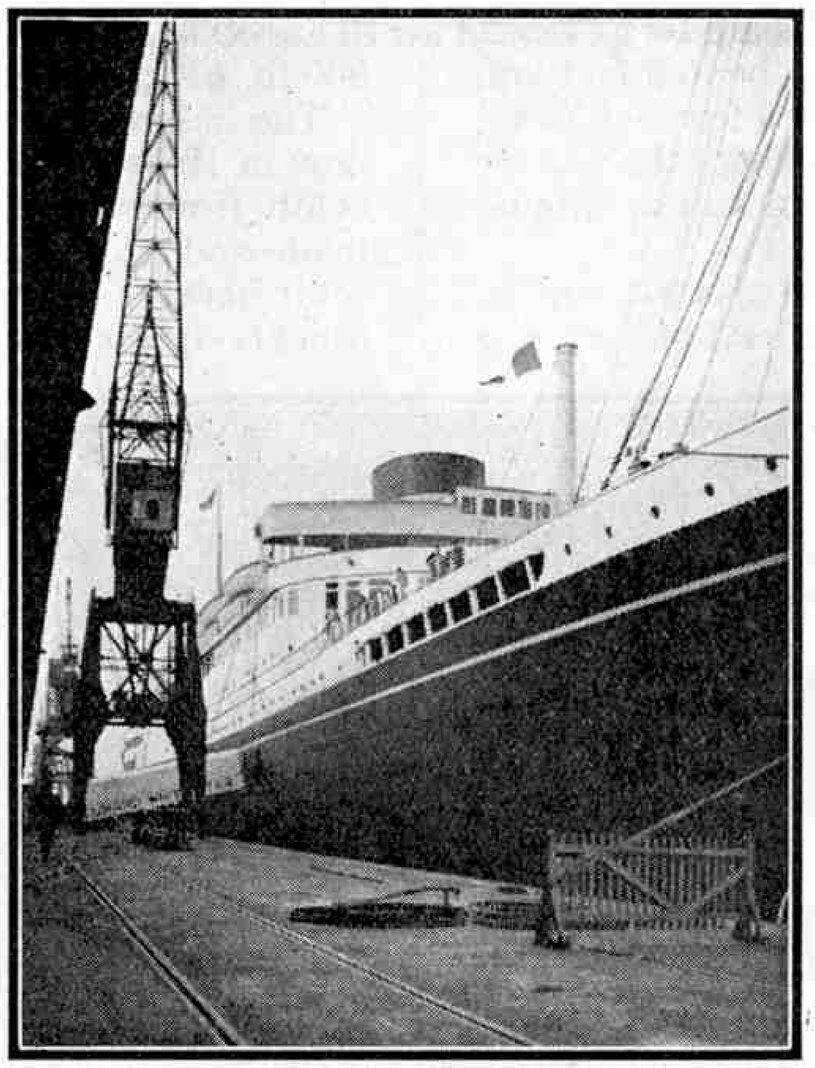


A fascinating glimpse of the Engine Room of the "Georgic."

The evening sun was now brilliant, and as we put out to sea the picturesque French port was looking its very best. Groups of sightseers gathered on the nearest quays to wave us farewell, the docks used by merchantmen were alive with shipping, and right away in the inner harbour at the Quai de Southampton was the little Southern Railway cross-Channel boat. The sun was gleaming in the windows of the hotels and fashionable villas along the esplanade as we passed abreast of Cap de la Hève; we passed the Whistle Buoy, and then just short of the lightship the pilot cutter was waiting. Our little tug was still tearing on ahead, but when we began to slow he dropped astern. A rowing boat was put out from the pilot ship and in a few minutes we were practically at a stop; the little boat approached on our starboard side, a rope ladder was lowered, and a moment later the Havre pilot had clambered down and the boat was being pulled away vigorously.

The *"Georgic"* was once more under way. The cliffs stretching away to Cap d'Antifer glowed a warm red, almost the colour of those of South Devon; the sun was sinking in a cloudless sky. The strong light from the west threw the wavelets into dark relief, the sky overhead changed, through the most glorious shades of pink, blue, and purple, and as it neared the horizon the sun's flaming disc developed an elongated shape like a Rugby football. A vivid green spread into the western sky after the sun had disappeared. Then the long line of cliffs changed colour to a wondrous violet blue, and the lighthouse on Cap d'Antifer began to flash. We were making a course almost parallel to this part of the coast, and now the beautiful chalk cliffs beyond the cape, of Etretat, and away towards Fecamp could be seen. Far astern Cap de la Hève light was now flashing, sky and sea blended into the deepest blue, and so we rode on into the night.

After dinner I came up on deck for a while. Four great lighthouses were flashing away to the south, Fecamp showed up as a row of shimmering lights, the sky was bespangled with stars, but—the lounge looked very cosy and inviting and I went inside again. The main lounge of the ship is a delightful place. The pervading colour-scheme is one of soft greys and browns; the style is essentially modern—the *"Georgic"* was not built till 1932—and the lighting very subdued and effective. The principal lights are carried on octagonal pillars of polished wood, and the lamps themselves contained in funnel-shaped shades; along the walls these are so arranged that the light throws into bold relief the moulding round the ceilings. Just outside is the long gallery, with its grey tapestry-covered walls, colourful bookcases and some curious Chinese ornaments. Here you are more conscious of being on board ship; wind-blown figures pass occasionally along the promenade deck just outside, there is the ever-present swish of the sea, and through the windows are seen the lights of a passing ship. In the Palm Court the heavy curtains were tightly drawn, an orchestra was playing in the lounge, and with this pleasant impression of the last night at sea I went early to bed.



Close-up of the "Georgic" at her berth, Ocean Dock, Southampton.

In the middle of the night there was a knock at my door. A steward came in with tea, and "We're approaching Dungeness, Sir." I looked at my watch; it was 12.15 a.m. I dressed hurriedly and went up aloft. In the passenger quarters it was most eerie; the lounge bore the same deserted look as a big hotel when you leave at dawn to catch an early train or boat. But up above things were very much awake. I could just distinguish the outline of the bridge, muffled figures were pacing to and fro, and a chink of light showed the whereabouts of the chart-room. Every now and then its curtains would be brushed aside as somebody passed, and then other figures inside the wheelhouse were silhouetted against the light. In the still night air voices carried to a remarkable degree and I could hear almost every word spoken on the bridge.

When I came up on to the boat deck Dungeness lighthouse was just abeam. The powerful shaft of light, travelling round, lit up the whole ship. Another vessel just on our port bow was picking up her Channel pilot. In our case Mr. Anderson had come aboard at Southampton, but ships not calling at any Channel ports stop off Dungeness, and their pilot is brought out on a Trinity House cutter. We drove on. We picked up Folkestone harbour lighthouse, and soon a long chain of twinkling lights revealed the positions of Hythe, Sandgate, and Folkeston itself; then farther ahead were the lighthouses of Dover Admiralty Pier, and the South Foreland.

A little to the north-east of the South Foreland are the Goodwin Sands, at low water left high and dry enough to play a cricket match. Between the Goodwins and the coast is the deep water channel known as the Downs. In times of storm this channel provides a placid anchorage, and then from Deal the sight of thirty or more vessels sheltering, of all sizes and shapes, is an extraordinary one indeed. But to-night, as one of the officers explained, we had plenty of time and so would take the longer course east of the sands. As we approached Dover the revolving beams from the lighthouses could be watched sweeping round. There was mist about, and try as we could to locate it, there was not a sign of the mightiest light hereabouts, the giant at Cap Griz Nez across the Channel. The Thames estuary is notorious for fog, and although it may be merely an early morning mist there is nothing for it but to drop anchor and wait till it lifts. The Goodwin sands are marked by three lightships and we were now approaching the "South Goodwin"; its watchmen also were apprehensive of fog, for the sound of the siren came moaning across to us. The channel through the Downs is marked by a chain of gas buoys, but a ship taking the outer course steers in a straight line from one lightship to the next.

Although the beams from the lightships shone yellow in the misty haze, it was most brilliantly clear overhead and the sky was bespangled with stars. Right across the heavens like a great arch stretched the Milky Way, Orion was ascending in the south-east while the Great Bear drooped towards the north. The fog siren of the "East Goodwin" came booming over the water, and this lightship has also a submarine bell by means of which vessels can calculate their bearings by wireless in dense fog. But the tide was turning, and this change of water seemed to disperse the mist for by the time that the "North Goodwin" was abeam the lights of Ramsgate stood out with astonishing clearness.

From now onwards, amid the shallows and mud banks of the Thames estuary, our progress was enthralling in the extreme.

To be continued)

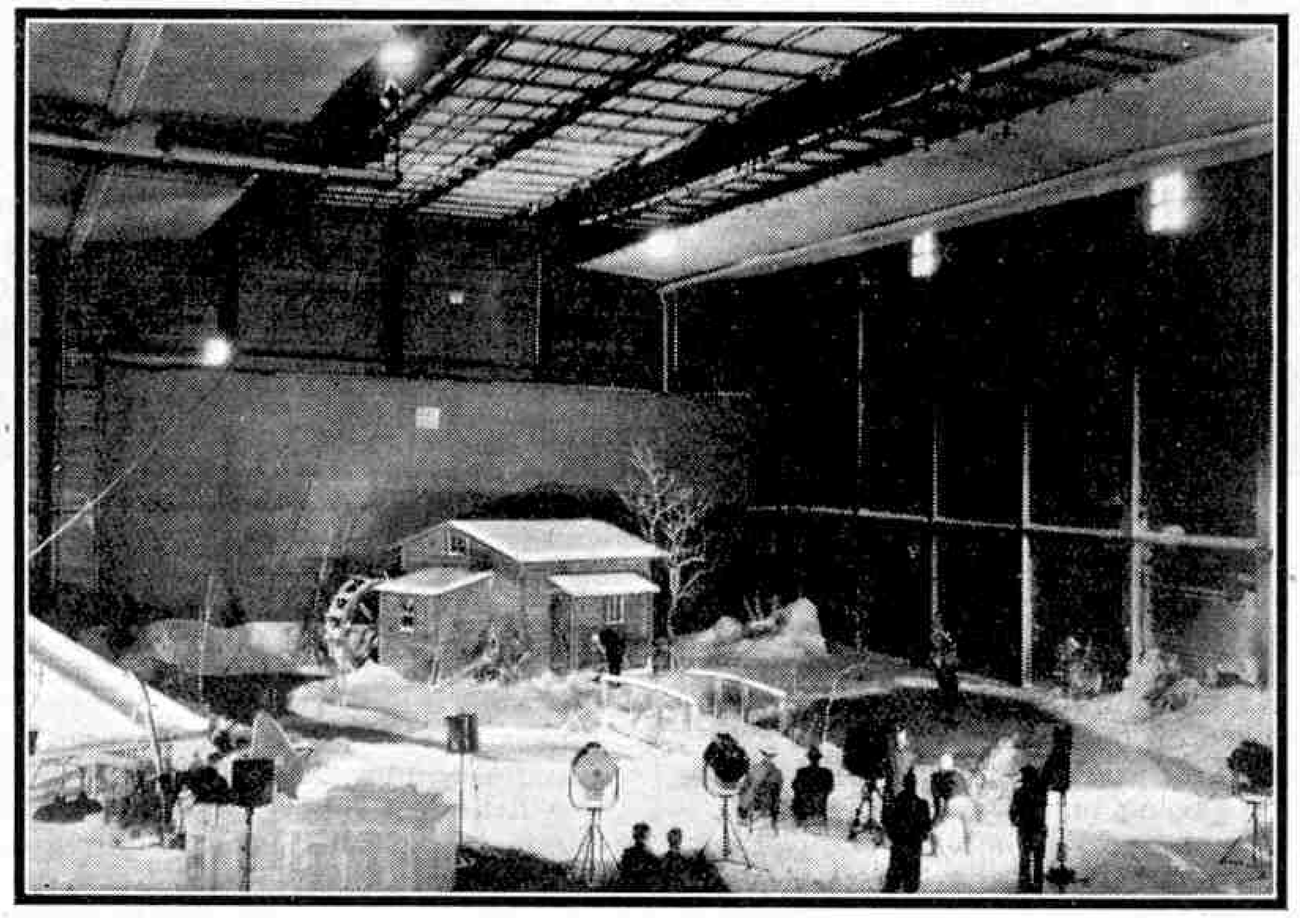
Snow Scenes At Hollywood

Machine That Creates Winter Blizzards

By Andrew R. Boone

ICY winds beat against the walls of a backwoods cabin, carrying snowflakes that swirl past the windows and pile up in drifts around the stoop. In front of the door, a snow-encrusted bridge spans a narrow expanse of glistening ice. Men and women, bundled up in heavy winter clothing, lean against the force of the gale as they move about, breathing puffs of fog into the wintry air.

When you witness the scene on the screen of your cinema, it will have an air of grim reality. And, as far as physical conditions go, this is a genuine blizzard that is being photographed. Wind, snow and ice, and even the icicles that fringe the eaves of the house, are real. The cameramen and technicians behind the battery of lights stamp booted feet and wave their arms to keep warm. Yet, only a few feet away, beyond the insulated walls of the stage where the picture is being made, the Southern Californian sun is shining with all its summer heat.



A winter scene of snow and ice in the refrigerated stage in Hollywood. Cooling pipes are suspended from the ceiling, and the walls and roof are insulated by granulated cork.

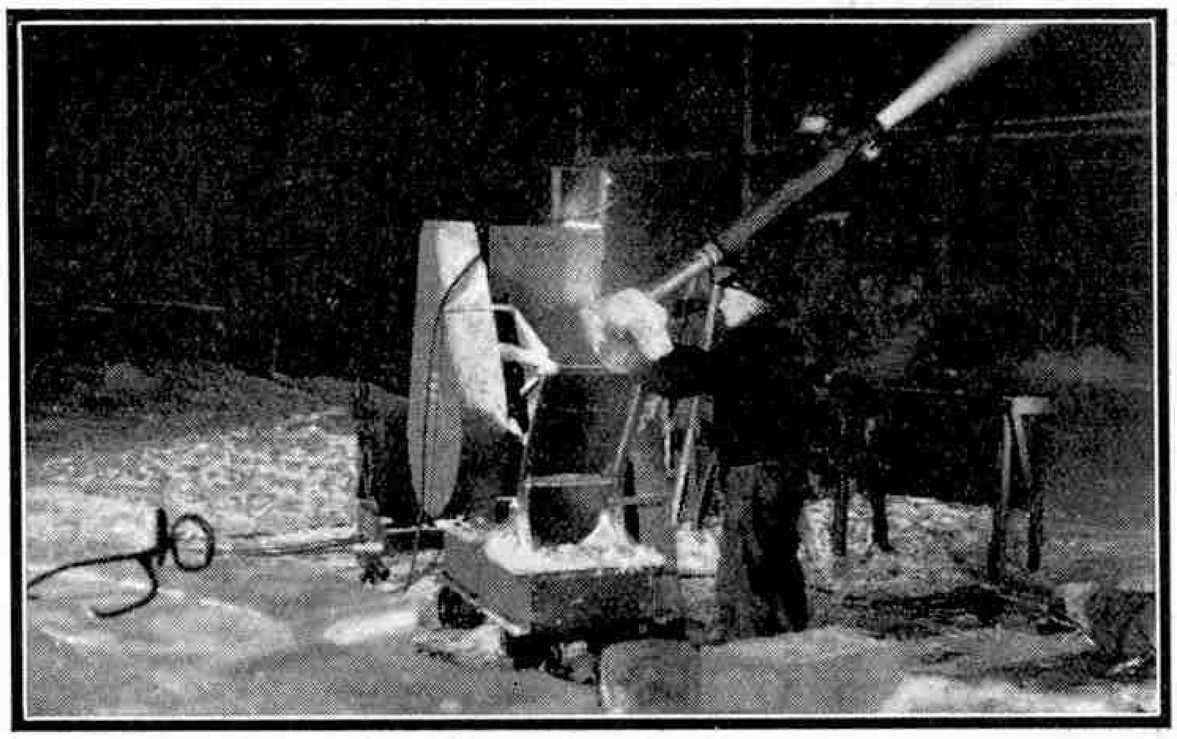
The refrigerated stage is Hollywood's latest aid in bringing realism to motion pictures. Instead of spending vast sums of money to send players and technicians "on location" to the snow fields of the Californian mountains, or even as far away as Alaska, producers now can film their winter sequences right in Los Angeles, only a short distance from their home studios.

The first of these ice-box stages utilises the interior of an ice-storage plant, which was stripped of its load of 10,000 tons of manufactured ice and studded with studio lights and painted sets. Snow slingers and wind machines were installed, making it possible to create at the wave of a hand any of the scenes common to lands of boisterous winters.

The building is 140 ft. long, 100 ft. wide, and 40 ft. high, with walls and roof completely insulated by a 14-in. layer of granulated cork. Three miles of coiled pipes lie in triple banks three deep suspended from the ceiling, forming a cooling system that can reduce the temperature of this vast room to 10 deg. F. above zero, and hold it there indefinitely.

A portable snow machine makes actual snow out of 25-lb. cakes of ice that are tossed into a hopper in which spiked cylinders crush them and chop them into flaky white chips. The snow is hurled through a centrifugal slinger 60 ft. out over the sets, where it drifts naturally upon roofs, fences and ground and clings realistically to trees and shrubs. Impelled by gusts from a wind machine, this man-made snow is said to be indistinguishable from the outdoor variety. The machine eats 300 lb. of ice for each minute of snow.

The cabin of a Canadian trapper can be reproduced now in Hollywood in midsummer. The icicles that hang coldly from its eaves are chill and brittle. They have been made and frozen in a water mould, and "pasted" on the set wherever needed by means of a little water that quickly freezes them solidly in place.



Making an artificial snow storm. The machine grinds blocks of ice into fine flakes, which are sprayed over winter settings for film scenes.

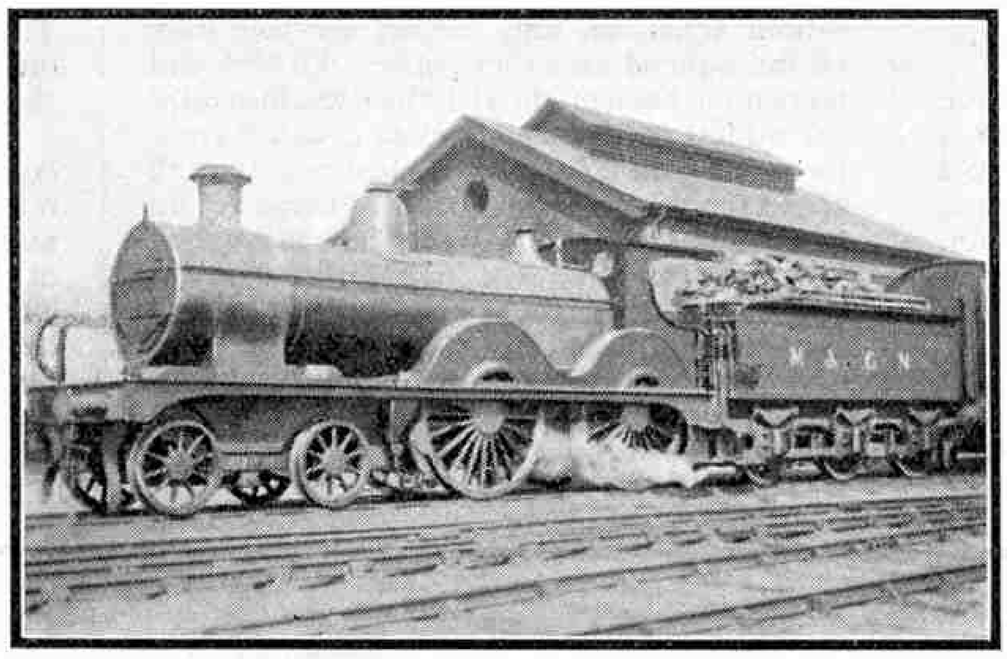
Before the advent of the refrigerated stage, a chemical known as "hypo ice" was used wherever the appearance of an ice sheet was needed on an indoor set, and white gypsum fluttered down out of a dull sky as a crude imitation of snow. But the effect was often destroyed by the unlifelike setting. "Fog-breath"—one of the touches of realism never before possible with indoor winter scenes—comes as a natural consequence of the low temperatures maintained on the set.

Even the Eskimo's igloo is faithfully reproduced with blocks of ice, laid like stones in a wall and then covered with a blast of snow from the snow-throwing machine. The frozen surface of a lake or stream is almost instantly made by flooding water upon the required spot. The ice withstands skate runners on its flinty surface.

The Midland and Great Northern Railway

An Interesting Joint Line

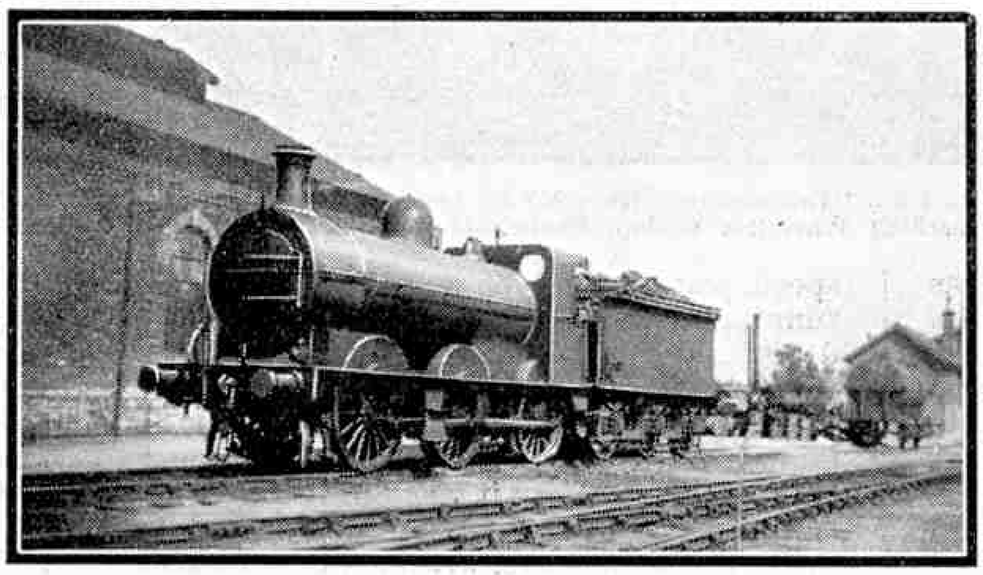
ON 1st October last there came to an end the independent operation of the Midland and Great Northern Joint Railway, for since that date the L.N.E.R. have been responsible for its working. Previously the system was managed by a Joint Committee consisting of L.M.S.R. and L.N.E.R. representatives, as the successors of the former partners the Midland and the Great Northern Railways. It is of great importance in East Anglia, particularly in connection with the agricultural, fishing and flower-growing industries, and during the Summer months it deals with much holiday traffic from the Midlands and the North to Cromer, Yarmouth and elsewhere.



A typical M. and G.N. 4-4-0 of former Midland design. The photographs on this page were taken by our reader D. Redshaw of Spalding.

The M. and G.N. passes from an end-on junction with a former Midland line near Little Bytham across to Yarmouth. On the way it receives a branch from Peterborough, and there are in addition branches from Melton Constable to Cromer, and to Norwich.

It was as a result of the amalgamation of several independent small lines in Norfolk that the system eventually became the joint property of the Midland and Great Northern Railways. In 1883 an amalgamation of several local lines formed the Eastern and Midlands Railway. Owing to a shortage of engines, an arrangement was made for the lines of this railway east of King's Lynn to be worked by the Eastern and Midlands Company, and those west of that point by the Midland and the Great Northern Railways. The lines west of King's Lynn were once nearly purchased by the Midland Company but this aroused protests from the Great Northern, with the result that joint working was established on this section in 1889 and on that east of King's Lynn in 1893. Until 1895 each section had a separate manager, the western section headquarters being at Spalding and those of the eastern section at King's Lynn. In that year a Traffic Manager for the whole line was appointed, with offices at King's Lynn, and until this year the M. and G.N. was worked as a separate concern, with its own engines and stock.



One of the Great Northern type 0-6-0 engines of the M. and G.N. This engine is practically unchanged from its original condition.

The Eastern and Midlands Railway originally had only 26 engines to work about 140 miles of railway. With the commencement of the interest of the Midland and Great Northern companies there appeared several 4-4-0 express locomotives typical of Midland design of the period. In the course of time they have been rebuilt according to the prevailing Derby practice, and some are now fitted with the "stove-pipe" chimneys that appeared on the new L.M.S.R. 0–4–4 tank locomotives that were constructed in 1932.

The first really suitable goods engines possessed by the joint concern were of Derby pattern. The G.N.R. section of the L.N.E.R. also is represented among the goods locomotives. In 1900 an arrangement was made whereby several standard G.N.R. engines then under construction should be passed over to the Joint line. These engines still retain the characteristics that marked the Ivatt classes of engines on the G.N.R. In view of the lengths of single track included in the main lines, all locomotives are fitted with tablet exchange apparatus, which is a prominent feature on the tenders. At one time the engines were finished in light brown, but this has now given place to very dark brown and black.

At the time of the formation of the Joint Committee, coaches from each partner were contributed to the stock already owned; and as the Doncaster and Derby locomotives differ, so also do the coaches originating at these places. More modern vehicles of course also have been provided, and these are typical of the standard practice of the representative groups. The through express services from the L.M.S.R. and the L.N.E.R. systems are formed of stock belonging to those Companies. The signalling equipment too is "joint" in character, some signals being of Midland pattern and others of the G.N.R. "somersault" type.

The engineering offices and workshops of the line are at Melton Constable. There the engines and stock are maintained and some of the "specialities" of the system in reinforced concrete are produced. This material has been used extensively for signal and fencing posts, gradient and mile posts, telegraph poles, crossing gate posts and for various other lineside items of this kind.

A feature of the line is the number of level crossings, of which there are 155. A little way away from the junction with the L.M.S.R. near Little Bytham is Toft Tunnel, which is 330 yd. long and is the only one on the line. Other engineering features include two large swing bridges, Breydon viaduct, which has five spans in all, and Cross Keys Bridge, which has three. The latter crosses the River Nene at Sutton Bridge and provides a way for road vehicles as well as the railway.

There is heavy traffic in vegetables and potatoes on the line, and the carriage of fruit has received special attention. A road collection service for this traffic, started in 1934, has been greatly extended.

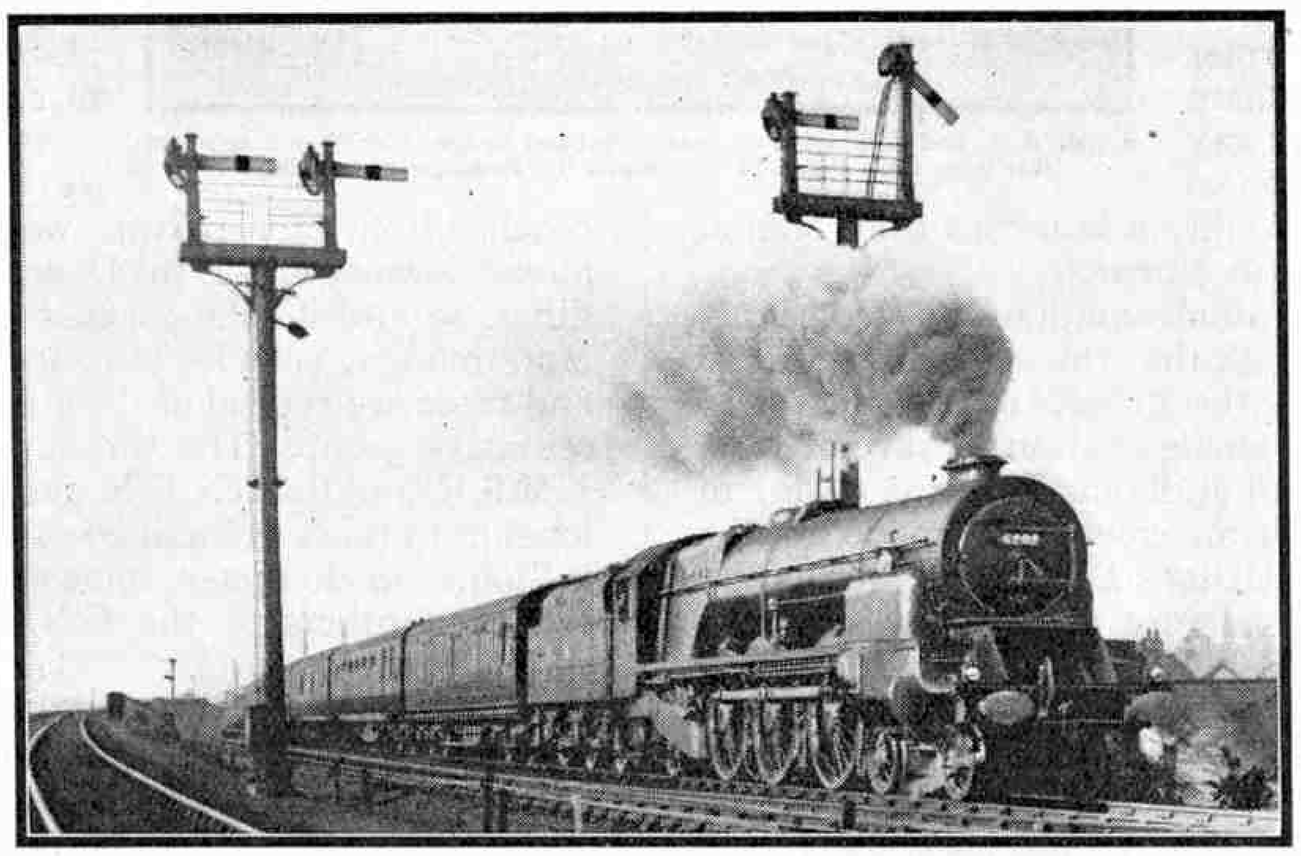
The L.M.S.R. "Turbomotive"

The turbine-driven 4–6–2 locomotive No. 6202 of the L.M.S.R. has become a familiar sight on the Euston and Liverpool expresses. It has worked on these services almost exclusively since its introduction, although trials were carried out earlier in the year with the dynamometer car on Anglo-Scottish trains.

From the *"L.M.S. Magazine"* we extract the following details of a run made by No. 6202 on the 5.25 p.m. up *"Liverpool Flyer,"* after having made the corresponding down journey on the 10.40 a.m. from Euston the same morning. The schedule of the *"Flyer"* involves a start-to-stop average of 64.5 m.p.h. over the 152.7 miles from Crewe to Willesden. On this occasion No. 6202 had a load of 11 vehicles with a tare weight of 315 tons, and was manned by Driver Fryer and Fireman Bodey of Edge Hill Depot.

In spite of greasy rails owing to the showery weather the 10.5 miles from Crewe to Whitmore were covered in 12¾ min., a steady acceleration to 61 m.p.h. being recorded up the 1 in 177 gradient. Signal checks through the Stafford area were experienced as far as Milford; after a maximum of 82 m.p.h. at Lichfield the Polesworth pitfall slack caused a reduction to 30 m.p.h. and Nuneaton was passed 4 min. late, but Willesden was reached a minute early, the 124.1 miles thither from Milford having been covered at an average speed of 69.4 m.p.h. Over the most favourable section of the journey, from Welton to Wembley, the average was 76 m.p.h., 83½ being recorded twice—before Weedon and before Wolverton respectively—and 82 m.p.h. at Hemel Hempstead. Rapid acceleration from slacks and a scrupulous observance of the latter were features of the run.

On another occasion No. 6202 regained 5 min. on this schedule with a tare load of 472 tons behind the tender.



The L.M.S.R. 4-6-2 "Turbomotive" No. 6202 on the 5.25 p.m. "Liverpool Flyer." The train is approaching Wavertree station. Photograph by the Rev. E. Treacy, Liverpool.

Records of *"The Silver Jubilee"*

During its first 12 months' service, which began on 30th September 1935, Britain's first streamlined train, *"The Silver Jubilee"* of the L.N.E.R., covered 132,397 miles, or more than half the distance from the Earth to the Moon.

The service has been so successful that it may be extended to Edinburgh on a 6-hour schedule, and similar services may be introduced on other routes. To this end tests have been made with the dynamometer car added to the usual seven-coach formations, and on 27th August last a new high speed record for British railways was set up when a maximum of 113 m.p.h. was reached by the streamlined No. 2512 *"Silver Fox"* in charge of Driver Haygreen. The load behind the tender totalled 270 tons, and the record was made on the descent from Stoke to Tallington on the up journey. The train ran at over 100 m.p.h. for 11 miles, and lunch was actually being served during this high-speed period, but the smooth and steady running of the train made it impossible to detect any undue increase of speed above the normal.

The previous highest speed of this now famous train was the 112½ m.p.h. attained on a trial run before it was put into service last year. The new record speed therefore is easily the highest ever attained by a British train in ordinary running.

On the corresponding down journey it was arranged not to exceed 90 m.p.h. in order to see the effect of this, in conjunction with an increase in load, on No. 2509 *"Silver Link."* Some remarkable running was the result, Driver Sparshatt being in charge on the footplate. An average of 82.6 m.p.h. was maintained over the 15.3 miles up from Tallington to Stoke, 90 m.p.h. being actually attained when the climbing had already begun. All slacks were carefully observed throughout and Newcastle was reached 4 min. inside schedule.

Subsequently successful trials were carried out between Newcastle and Edinburgh. These were carried out on a Saturday, on which day the train does not make the London run.

So far only one set of *"Silver Jubilee"* coaches has been available and it is a remarkable tribute to their sound design and construction that practically the whole of the mileage has been performed by them. The working of the train devolves chiefly on three of the four streamlined "Pacifics" built for the service. These are No. 2509 *"Silver Link,"* No. 2510 *"Quicksilver,"* and No. 2512 *"Silver Fox,"* all attached to King's Cross shed; No. 2511 *"Silver King"* is allocated to Gateshead and stands by to relieve any of the others as may be necessary.

"The Railway Handbook 1936-1937"

The 1936-1937 issue of this handbook maintains its reputation as a most useful work of reference. It contains statistical information relating to the railways of Great Britain and Ireland. Its contents are by no means confined to masses of figures, however, and it also includes general particulars of the principal systems and their development, and a brief history of railway events arranged in chronological order. Various aspects of railway working are dealt with and different forms of motive power are considered, and there are some useful details relating to locomotives and rolling stock generally, permanent way and signalling. In addition such items as fastest runs, greatest altitudes, steepest gradients, largest stations and many others are included.

Although the contents deal primarily with the railways of Great Britain and Ireland, international comparisons are necessarily made in certain sections. The matter is very comprehensive and the "Handbook" fairly claims to be the cheapest publication available that presents so much information in convenient form. It costs 2/6 nett and is published by The Railway Publishing Company Limited, 33, Tothill Street, Westminster, London, S.W.1.

A New *"Patriot"* Locomotive

L.M.S.R. No. 5500 is to be named *"Patriot"*; the name was originally applied to a *"Claughton"* in honour of the L.N.W.R. men killed in the War, but this engine was scrapped last year.

High Speeds with "Football Club" Locomotives

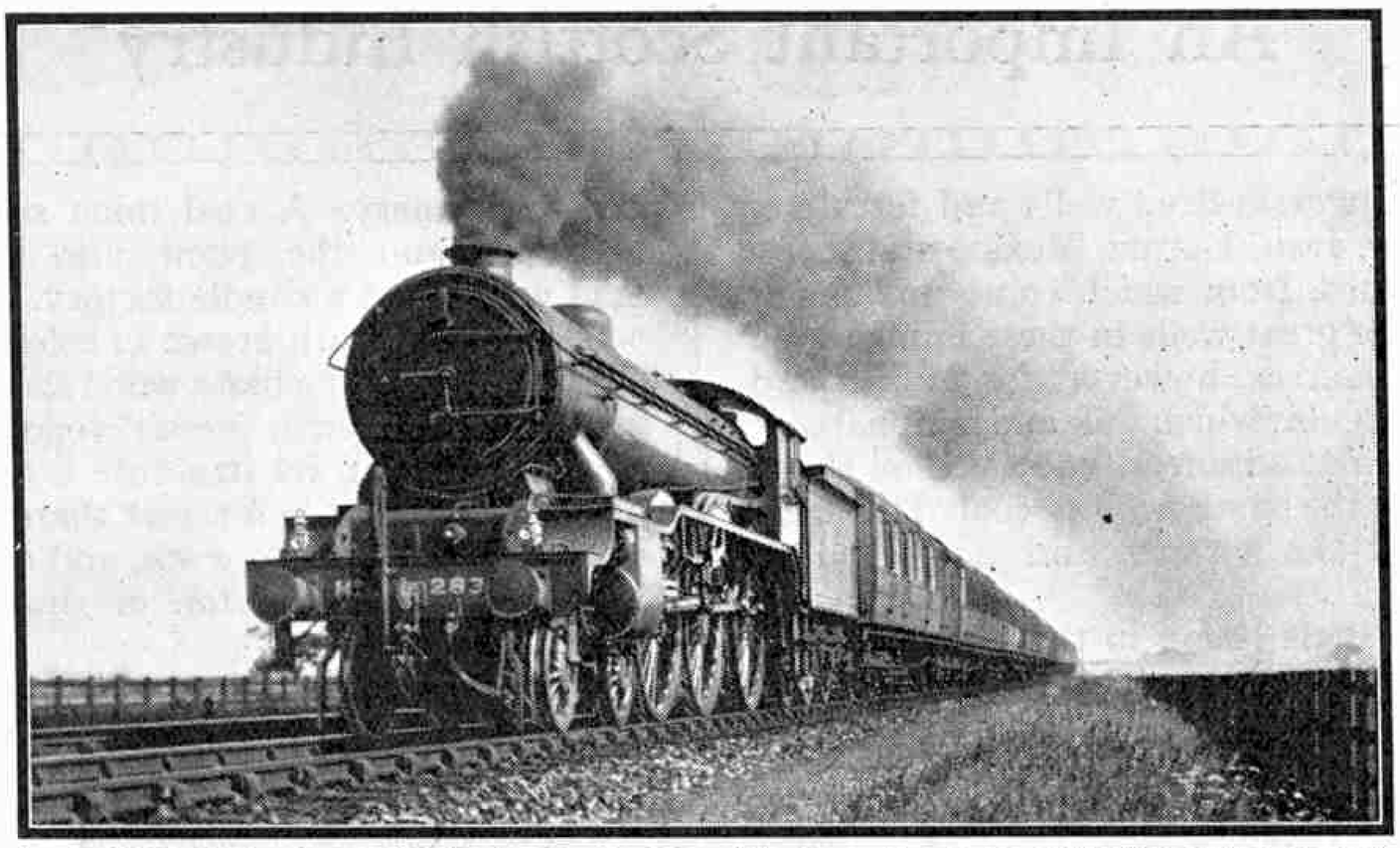
Reference has been made several times recently in the *"M.M."* to the excellent work being done on the Great Central section of the L.N.E.R. by engines of the "Football Club" series of the 4–6–0 "Sandringham" class, and readers will no doubt be interested to learn that these fast runs are being made with the utmost ease.

On a recent run with the up Manchester express due into Marylebone at 1.10 p.m., No. 2851 *"Derby County"* was worked at 15 per cent. cut-off for practically the whole distance, and this with a load of nearly 300 tons. From Rugby to Woodford the 14.1 miles, half of which are rising at 1 in 176, were run in 17¼ min. start to stop, and 20 per cent. cut-off was sufficient to sustain 51 m.p.h. up the long bank through Catesby tunnel. The next two sections, Woodford-Brackley and Brackley-Aylesbury were covered entirely on a cut-off of 15 per cent. and yet the former stretch of 9.8 miles was run in 12½ min., and the latter, 21.3 miles, in 23 min.

Starting away from Aylesbury, up the stiff rise at 1 in 110 on to the Chilterns, 25 per cent. was used as far as Stoke Mandeville, where speed had risen to 40 m.p.h., but from there to the summit 20 per cent. was enough. Fast running followed with the engine now working on 15 per cent.; a top speed of 72 m.p.h. was reached at Great Missenden, and Amersham summit was passed at 50 m.p.h. After that things were so well in hand that no higher speed than 70 was reached on the descent to Rickmansworth, and the 38 miles from Aylesbury to Marylebone were completed in 46 min., three minutes inside schedule time.

The driver who was responsible for this good work, Green of Leicester shed, made some brilliant running later with No. 2855 *"Middlesbrough."* The train this time was the 4.55 p.m. from Marylebone, loaded to 300 tons, the journey being recorded from Leicester onwards. A very rapid start was made, speed rising to 50 m.p.h. up a gradient of 1 in 176 as early as Belgrave, 2¼ miles out. Really high speed followed with 81 m.p.h. through Loughborough, 62½ over Barnston summit, and a well-sustained 77 near Ruddington. Nottingham (Arkwright St.), 22½ miles, was passed in 21 min. 55 sec. from the start and in spite of a signal check right at the finish, the 23.4 miles from Leicester to Nottingham (Victoria) took exactly 24 min. Here again the engine was worked at little over 15 per cent. cut-off all the way.

These runs were timed by Mr. O. S. Nock.



An L.N.E.R. Harrogate express passing Barnby Moor. The locomotive is No. 2833 "Kimbolton Castle," one of the 4-6-0 "Sandringham" class.

Brighter Railway Stations

Following a series of experiments, the L.M.S.R. have adopted a range of six standard colours for painting their 2,500 passenger stations in a more cheerful and more attractive style than has hitherto been employed. These colours include two light shades, either of which can be used in conjunction with any one of three dark shades. The sixth colour, golden brown, is being used sometimes by itself and sometimes in conjunction with another paint; it is particularly useful at stations where there are electric trains, for there the air contains a certain amount of iron dust, which causes a rust-like stain on paint work. The effects of this are reduced when golden brown paint is used. Ultimately all L.M.S.R. passenger stations will be painted in accordance with the new colour scheme.

Continuing their general policy of "brighter stations" the L.N.E.R. have recently placed contracts for the painting and cleaning of a number of stations in Scotland. These include St. Andrews, Buchlyvie, Kilsyth, Campsie Glen, Strathblane, Aberfolye, Gartmore, Port of Menteith, Blanefield, Balfron, Gartness, Dumgoyne, Killearn, and Gargunnock.

An L.M.S.R. Blackpool excursion train from the Midland Division passing Dore West Junction. The illustrations on this page are from H.R.C. prize-winning photographs by C. Spencer, Sheffield, H.R.C. No. 44179.

A New "Coronation" Engine

One of the L.M.S.R. engines of the 4–6–2 "Princess Royal" class is to be named *"Coronation"* in honour of the coronation of His Majesty King Edward next May. This step follows the precedent established in 1911, when one of the L.N.W.R. express engines then being built at Crewe Works was so named in honour of the coronation of King George V and Queen Mary.

The earlier "Coronation" engine was the 5,000th locomotive to be built at Crewe. It is now L.M.S.R. No. 25348 and is stationed at Chester, but will shortly be withdrawn from service, as this type of engine has become obsolete. It was illustrated on page 348 of the June 1935 issue of the *"M.M."*

The new *"Coronation"* and its tender will weigh over 160 tons. The corresponding weight of its older namesake is less than 100 tons, and the two *"Coronation"* engines will typify the progress of a quarter of a century in locomotive design and construction.

By Train Ferry to Paris

On 14th October, the Southern Railway introduced a new Channel Train Ferry Service between London (Victoria) and Paris (Nord). Through first and second class sleeping cars now leave London at 10 p.m. and Paris at 9.50 p.m. nightly, completing their journeys at 8.55 in Paris and 8.30 in London the following morning. Customs and passport examinations are carried out aboard the trains, which cross the Channel on board 3,000-ton train ferries having accommodation for 500 passengers. Each ferry can accommodate 12 sleeping cars, or 40 loaded goods wagons, and has a fireproof insulated garage for 25 motor cars, as well as fully equipped restaurants and other accommodation.

As the daily rise and fall of the tide on both the French and English sides of the Channel is between 10 and 20 ft., new locks have been constructed to enable the ferry vessels to be operated at any time.

The G.W.R. "Grange" Locomotives

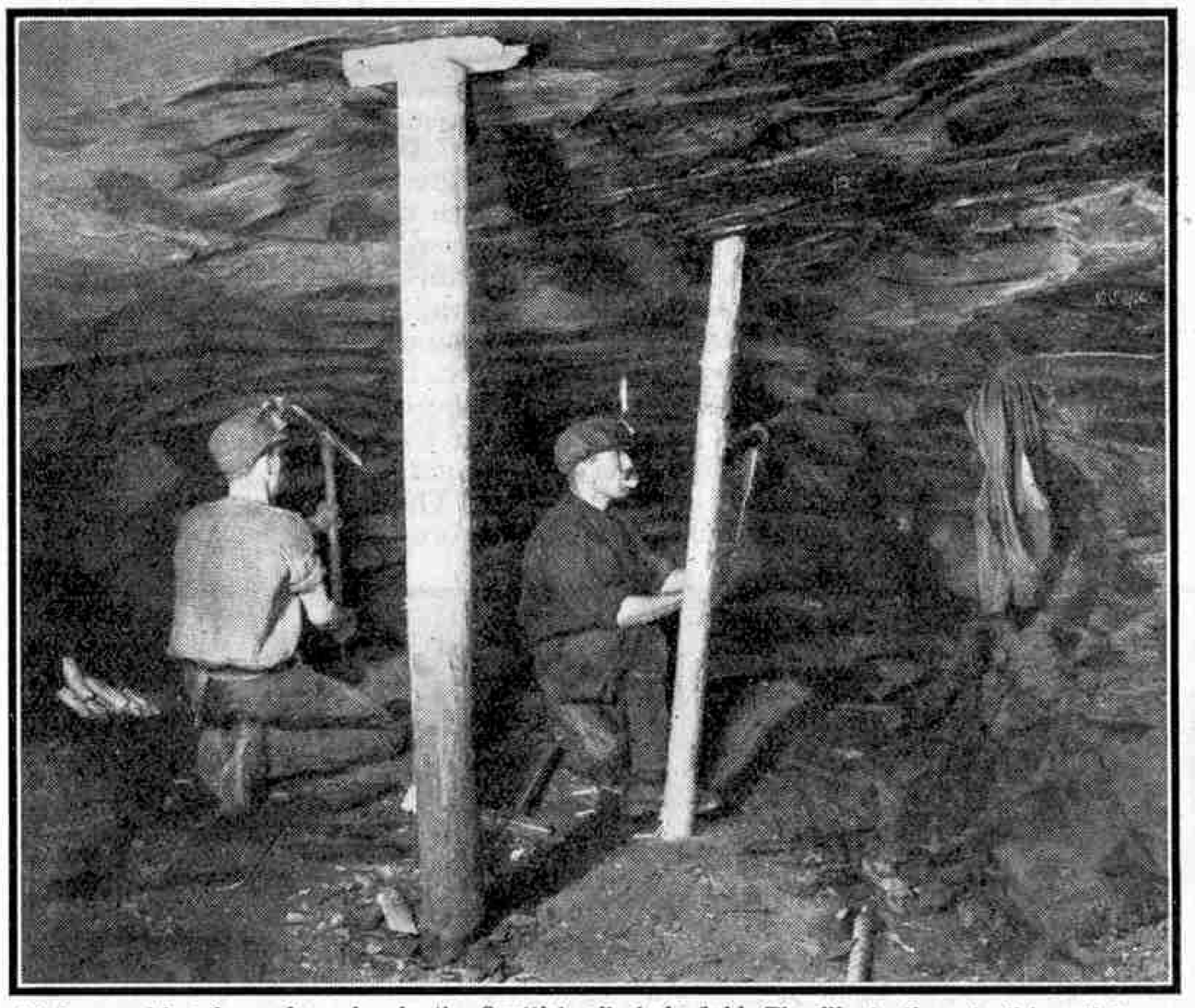
The G.W.R. have just introduced a new class of 4-6-0 mixed-traffic locomotives designed to ensure the more expeditious working of the Company's already speedy freight services. The new engines have been built at the Swindon Works, and are known as the "Grange" class. The names selected for the first 10 engines were given in the August *"M.M."* this year. The "Granges" will be used for hauling market produce from Cornwall, Worcestershire and other districts, and also for excursion traffic. They replace the condemned 2–6–0s of the 4300 class.

Oil from Shale

An Important Scottish Industry

THE mention of oil suggests deep wells and forests of steel derricks in Iraq, Iran, Burma, Mexico and many parts of the United States, from which come millions of gallons of petroleum. The great wells in these immense oil fields are not the only sources, however, for in Scotland there is a large industry in which oil and sulphate of ammonia are produced from a mineral known as oil shale, which is mined in much the same way as coal. The shale sometimes crops out at the surface, and is worked as deep as 1,500 ft.

The story of oil from shale began in the middle of last century, the industry owing its origin to James Young, a Glasgow chemist who had distilled an illuminating oil from an underground source in Derbyshire. Young's experiments were the foundation of the modern petroleum industry, for he believed that natural oil was produced from some kind of coal by underground heat, and tried to make it artificially. This led to the establishing of a plant at Bathgate, in West Lothian, Scotland, for distilling illuminating oil from Boghead Coal or Torbanehill mineral mined there. The supply of this material soon gave out and attention was next directed to oil shale beds discovered at Addiewell, Broxburn and in other places, principally in West Lothian and Midlothian. The shale did not give such a good yield of oil as the Boghead Mineral previously used, but it was so abundant and cheap that the new industry flourished, and by 1865 there were 120 works in operation producing oil from it.



At the working face of a mine in the Scottish oil shale field. The illustrations to this article are reproduced by courtesy of Scottish Oils Limited.

Then came the discovery of the prolific oil fields of the United States. The petroleum obtained directly from the earth was cheaper than the oil distilled from shale, and as a result of its competition many of the mines and works in the shale field were abandoned. The survivors turned their attention to other valuable products, such as lubricating oils, paraffin wax and sulphate of ammonia, and their enterprise brought renewed prosperity to their undertakings.

In 1913 $3\frac{1}{4}$ million tons of shale were mined and used in the distillation of oil and other products, but for a time further development was checked by the outbreak of the Great War. At the end of the conflict the six companies at work were brought under one management, forming Scottish Oils Ltd., and to-day the company works 13 mines, the output of which is dealt with in five crude oil works and a central refinery. A coal mine supplies part of the fuel required, and the plant also includes two sulphuric acid works and a candle factory.

The shale is dark brown in colour and can be cut with a sharp knife, curling like a wood shaving. It has been formed in successive layers, pressed together like the leaves of a closed book, and its structure is more easily seen when it has been distilled in a retort than when it is in its natural state. It is difficult to work, and can only be dislodged by blasting. To mine a ton of shale requires almost $\frac{3}{4}$ lb. of explosive.

The largest mine is that at Westwood, near West Calder. This has an output of 700 tons a day, in which two shifts are worked, but is designed to yield a higher output. The mine covers an area of about 500 acres and works two seams, known as the Broxburn and Dunnet Seams. These are 5 ft. and 11-12 ft. in thickness respectively, and are separated by 380 ft. of sandstone and other minerals.

The Westwood pit has two shafts, which were sunk between the years 1915 and 1917. The downcast shaft is 16 ft. in diameter, and the upcast is 14 ft. across. Both are sunk to a depth of 700 ft. and are lined with brick from top to bottom. The downcast shaft is used for winding shale and men, and the upcast shaft carries water pipes and electric cables, and is only used in case of emergency. Two single deck cages work in the downcast shaft, each carrying two hutches that together weigh about 10 cwt. and carry about 36 cwt. of shale. The steel wire ropes used to wind the cages in the shaft are $1\frac{3}{8}$ in. in diameter and in addition there are three guide ropes and two rubbing ropes between the cages, all being of the same size as the winding rope.

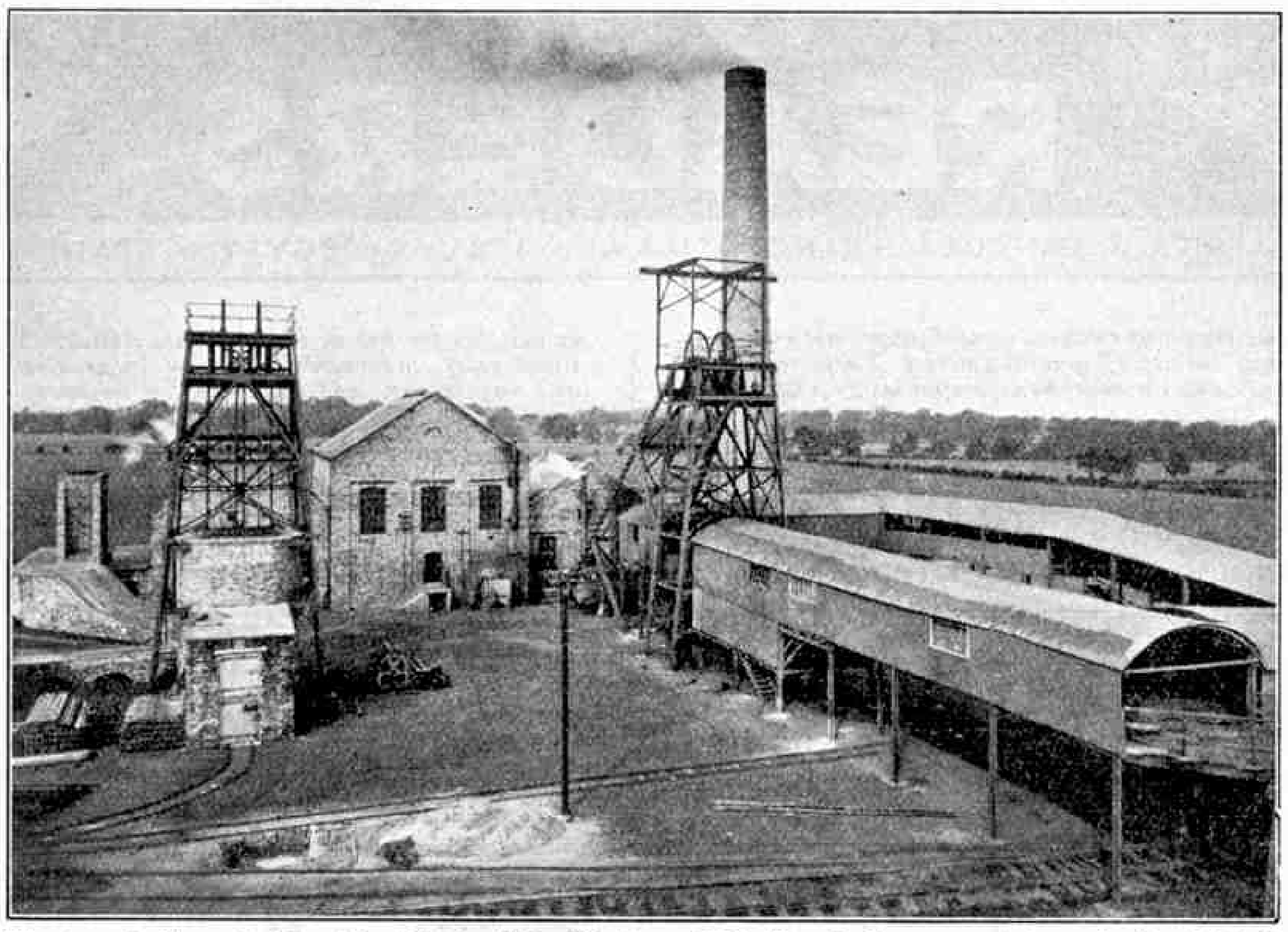
The visitor to the Westwood pit finds himself on the main haulage road as soon as he steps out of the cage that carries him down the shaft. Alongside are the pit pony stables, the pump rooms and the haulage rooms, in which is the machinery that drives the endless ropes used in hauling the hutches to and from the working faces. These are now well away from the pit bottom, some of them fully a mile distant. The shale is worked by what is known as the "stoop and room" method, the shale seam being formed into pillars or "stoops" in the first operation, the pillars or stoops being extracted in the second operation. In working the Dunnet Seam, a thickness of only 9 ft. is taken when the stoops are

formed, and the full thickness when extracting the stoops.

No mechanical contrivances have yet been found advantageous for working the shale. The shot holes are bored with hand boring machines, which the miners are experts at working. After blasting the shale is worked off by picks and "pinches."

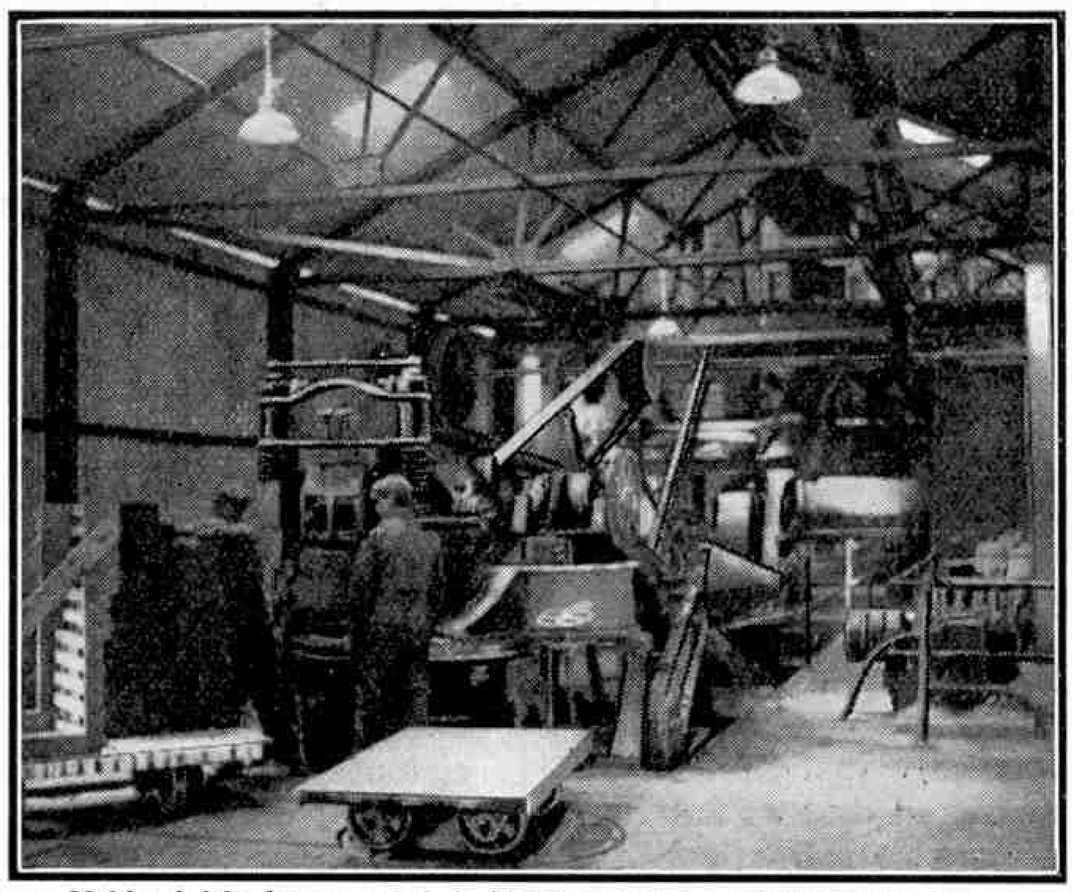
The pit is ventilated by means of a single inlet Sirocco fan that is connected to the upcast shaft by means of a drift, or airway. The fan is nearly 9 ft. in diameter and runs at 140 r.p.m., driving 100,000 cu. ft. of air through the mine every minute.

The shale reaches the surface in pieces that are too large for the treatment it has to undergo, and these are reduced to about the size of a man's fist by heavy toothed rollers or "breakers" in crushing machines. Then it passes on to the retorts. These are of giant size, measuring 43 ft. 6 in. from top to bottom, with a width of 2 ft. at the top and 2 ft. 9 in. at the bottom. Each holds about four tons of shale. Its upper portion is of cast iron and the lower part of firebrick, and at the top and bottom are hoppers for charging the retort and removing the spent shale respectively.



The two shafts and pithead buildings of the Westwood Pit. The shafts are sunk to a depth of 700 ft.

The retorts are built up in towering banks, four in a set and 13 sets in a bench, and at the Deans Oil Works, one of the five in which crude oil is made, there are six benches, making a total of 312 retorts in all. The shale comes from the Westwood Pit, which is 3½ miles away, and two other mines nearer the works. It is carried over the intervening distance by means of endless rope haulage, and on arrival is shot from the trucks into the steel charging hopper of one or other of the retorts. There it passes slowly downwards, taking 24 hrs. to travel from top to bottom, so that the shale is treated in each retort at the rate of four tons a day. As it moves downward it is gradually heated to a temperature of 1,300 deg. F. The oil vapour is given off long before this stage is reached, however, a temperature of 650 deg. F. to 900 deg. F. being sufficient for this purpose.



Making bricks from spent shale from the retorts in which oil is distilled.

As the shale descends and becomes hotter it meets an upward current of steam that converts the nitrogen in the shale into ammonia. About 90 to 100 gallons of steam are introduced into the retorts for each ton of shale. In addition to converting the nitrogen in the shale to ammonia, it cools the spent material, distributes the heat evenly through the discharge hopper, and carries the oil vapour away quickly and thus prevents it from "cracking."

The shale is passed through the retorts continuously, and the oil vapour and gases are drawn out at the top by means of the exhausters that carry them into condensers, where liquid oil and water are condensed and collected. The incondensed gas still contains ammonia and light spirit. The first is removed by scrubbing with water and the second by scrubbing with oil. The permanent gas is returned to the retorts for heating and is augmented by producer gas. Steam is passed through the ammonia liquor, and the gas thus expelled from it is absorbed in weak sulphuric acid to make sulphate of ammonia, a valuable fertiliser. The spent shale also is turned to good account, for it is made into bricks of excellent quality.

The oil distilled from the shale in this manner is too crude to be used and requires further treatment in order to separate it into fractions that can be used for motor fuel, as solvents for use in the rubber and linoleum industries, and oils suitable for burning or for Diesel engines. The first step in refining the crude oil is distillation, and this is carried on at a special plant at Pumpherston, where the crude oil from the Deans and other retorting plants is dealt with. A bench of five boiler stills is used, each having a capacity of about 6,000 gallons. The crude oil runs continuously into the middle still of the five and the residue is fed into the two stills on each side of it. As the distillation continues, the liquid remaining in these is again run off into a range of smaller stills in which it is heated until only coke remains. Steam is injected into all the stills, partly to check the decomposition or breaking up of the oil and partly to stir the liquid up and thus prevent the deposit of the carbon formed during distillation.

The carbon or coke left behind in the coking stills is particularly suitable for making the best class of electrodes for electric furnaces. Resin also is formed, but the greater part of the crude oil is vaporised and condensed separately. Even yet it is not suitable for any definite purpose, however, and it has to be washed with sulphuric acid and caustic soda, and again distilled, in order to separate it into a crude burning oil, a heavy oil containing solid paraffin and a coke that is an excellent household fuel. Further refinement transforms the crude burning oil into grades suitable for domestic and power use, lighthouses, railway signals and other purposes, and paraffin wax also is obtained from it.

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A Canoe Trip Down the Severn

Our party consisted of three boys and a master, and our boats were a falbot, a canoe of German make, and a three-seater Canadian canoe that was hired from Shrewsbury.

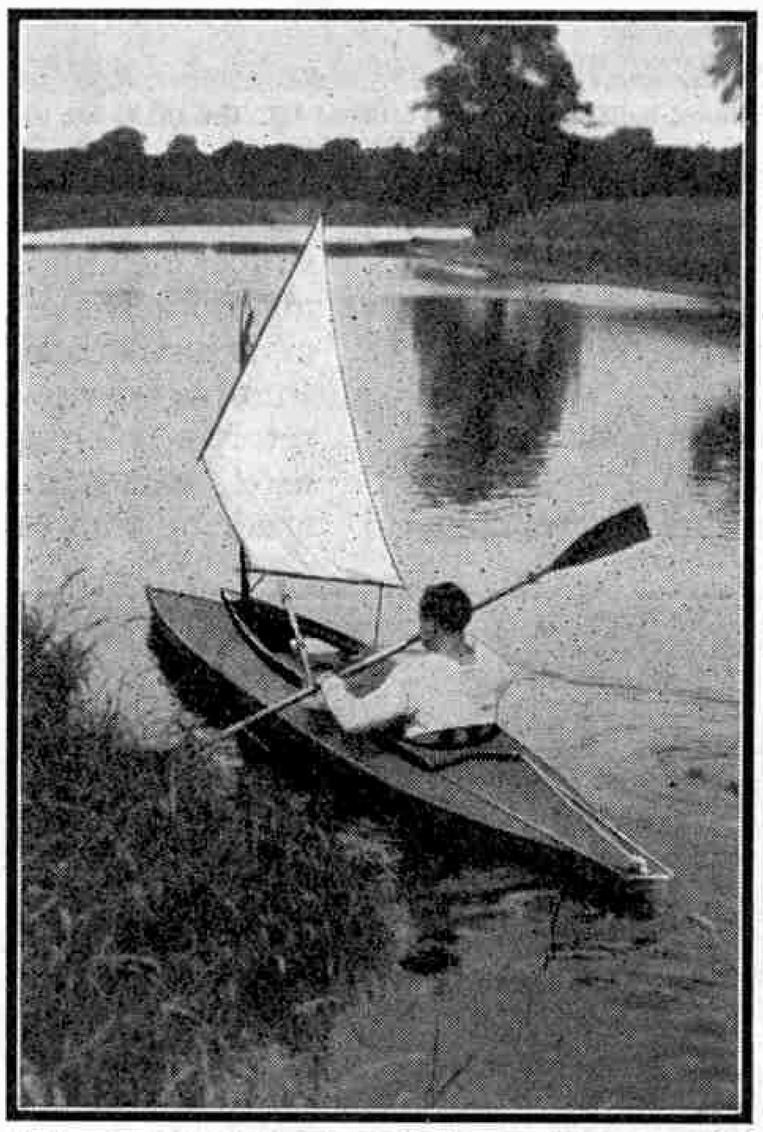
We started from Newtown, which is 42 miles from the source of the river, amid the jeering of many who had turned out specially to see us. Progress during the first two days was slow, and we covered only five miles. This was because we lacked experience. On approaching a rapid, we would tie up the boats and wade across it to find the deep channel. This entailed a certain amount of risk, owing to the speed of the current as it rushed a foot deep over the slippery stones. If we found a sufficient depth of water we would paddle the boats through without more ado, but in some places the boats had to be lifted over.

At weirs and dangerous bends it was necessary to make a portage, unloading everything from the boats and carrying them across the land, and loading up again on launching. Later we became more skilled in finding the deep channels, and then we shot through without preliminary investigation.

On one occasion our daring was rewarded by catastrophe, the unfortunate occupants of the falbot being thrown into the water when it capsized after being swept into a current that ran deep under a low-lying row of willows. There were some hectic moments while they rescued themselves, the boat, and its contents and the paddles from the torrents. A coat in which most of our money was kept was only just saved. We landed to dry our clothes and discovered that we had lost our only Primus stove, a deck-cover, two rain-coats and a leather bag containing spares and some money.

We then proceeded very carefully, and our only further mishap was the breaking of a paddle, which was repaired with a piece of over-size curtain rod discovered after a long hunt through garages and scrap heaps. After passing the last rapid at Bridgenorth we did 28 miles in one day, which was good, as the current was slow. In all we covered 114 miles, and finished at Worcester, although we had planned to go on as far as Gloucester.

M. SAYERS (London, W.C.1).



On a canoe expedition down the Severn. Photograph by M. Sayers, London, W.C.1.

How Cigarettes Are Made

During a tour of a cigarette factory that I enjoyed recently, I was greatly impressed by the order and cleanliness to be observed everywhere. The care shown for the welfare of the employees also was noteworthy. Doctor's and dentist's rooms are provided and there is an excellent restaurant.

The leaf tobacco arrives in the factory in large casks containing about 800 lb., and many of these were being opened in the store-room during my visit. The leaves are passed through large revolving cylinders, in which they are steamed, and from there are taken by lift to the stemming room, where hundreds of girls sit at long tables stripping off the stalks. The stripped leaves are placed in canvas buckets, weighed and checked, and then sent down chutes to a large room in which they are stacked in "blocks" according to the kind of cigarette to be made from them.

The tobacco is now transported by a belt into the cutting room, and is placed on a slow travelling belt that guides the leaves between rollers about two inches apart by which they are compressed. As they emerge they are cut into thin shreds by oscillating knives. The blades of each cutter have to be removed and re-sharpened by a special machine every ten minutes. The cut tobacco is now fed at the rate of 10 lb. per min. into a heated revolving cylinder, fitted with radial bars, which breaks up and dries the shreds.

Then follows actual cigarette making, which is carried out on fascinating machines that work with uncanny precision. The tobacco is placed in a hopper, and a roll of cigarette paper is placed on a spindle below it. The tobacco shreds are teased out and fed into the paper, on which is printed the name of the maker and the brand of cigarette, and the wrapper then is curled round the tobacco and sealed up. An oscillating knife then cuts off the length to form a cigarette. The output is delivered on two moving bands. The machine also counts out cigarettes in bundles of 25 and weighs them, defective cigarettes being rejected.

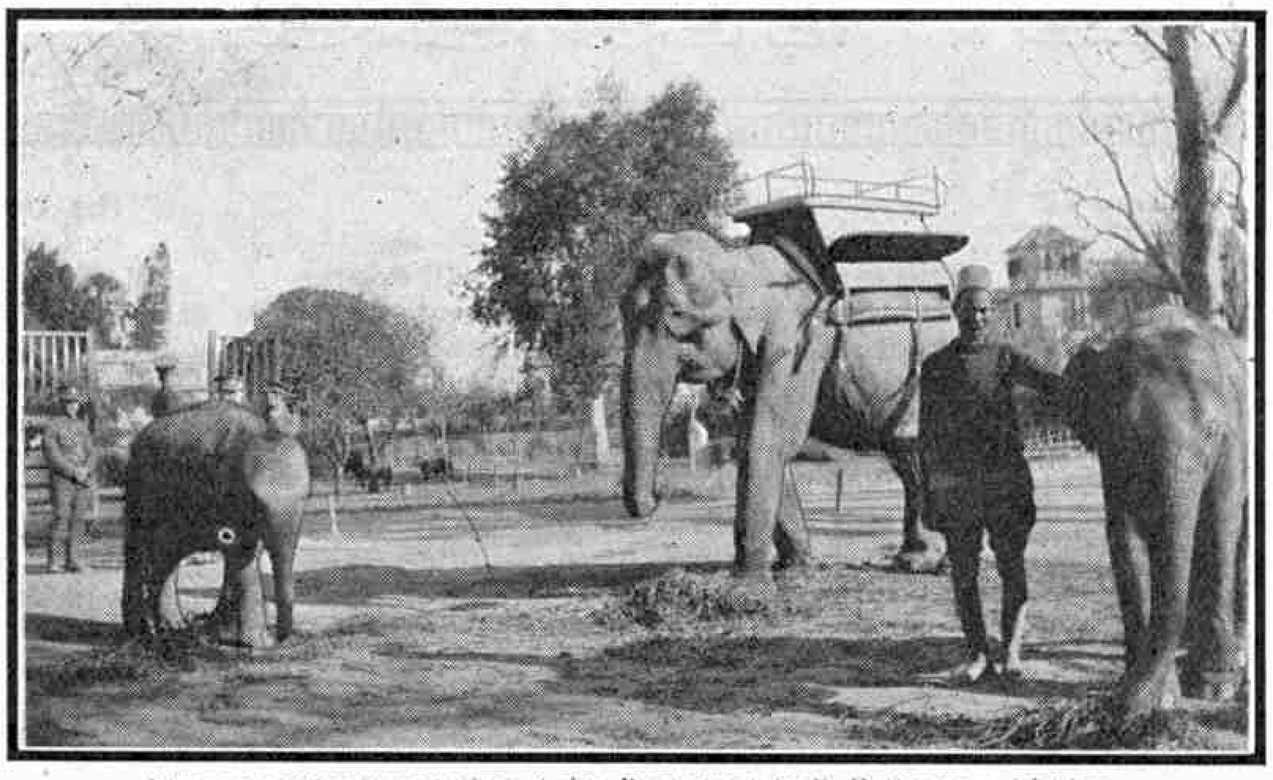
The cigarettes are placed in trays and wheeled to the packing room, where they are wrapped in moisture-proof transparent material and packed into cartons.

L. WRIGHT (Pengam).

The Zoo at Cairo

The upper photograph on this page shows a family of elephants, consisting of a mother and two sons, and was taken when I visited the Cairo Zoo. The elephants were from India and are used for giving rides to visitors.

The Cairo Zoo is in Gizeh, a suburb of Cairo on the road to the pyramids. Most of the creatures in it come from the African forests and form an interesting collection, many beautiful parrots being a particularly attractive feature. Most of the exhibits are in cages, but the hippopotamus is a notable exception, as it has a large pond in which to disport itself and an island where it can bask in the sun.



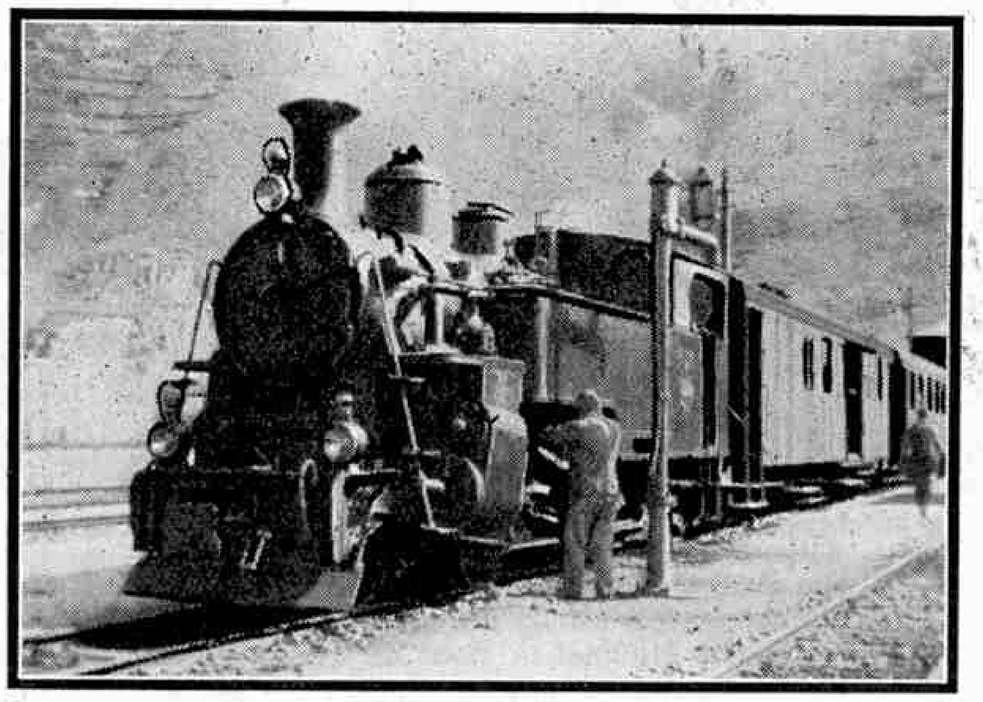
Elephants at the Zoo at Gizeh, Cairo. Photograph by D. F. Gresham, Bickley.

Although the climate of Egypt is so hot, there are polar bears in the Zoo, living in quarters that have been equipped with cooling apparatus in order to make them more congenial. The bears, and indeed all the animals in the Zoo, were in a very healthy condition when I saw them, and are well cared for by their Sudanese keepers.

D. F. GRESHAM (Bickley).

A Swiss Metre Gauge Railway

When I was in Switzerland I was greatly interested in the Furka-Oberalp Railway. This is of metre gauge and is operated by steam, as it was found that the cost of electrification would never be cleared in a railway such as this, which is closed in winter. The line is about 50 miles long, and extends from Brig to Dissentis by way of Andermatt, where the main Swiss railway lines are touched not far from the portals of the St. Gotthard Tunnel.



Locomotive No. 1 of the Furka-Oberalp Railway at Andermatt. Photograph by J. D. Fage, Teddington.

The railway follows the valleys of the Rhone, Reuss and Rhine, and besides taking sight-seers through a region of mountain peaks and glaciers, it forms an important link in Switzerland's communications from east to west. It was built in 1910-14, but was not opened until 1926 owing to the effects of the Great War. The locomotives are all 2-6-0 tanks and the rack system is of the Abt type, which allows combined rack and adhesion working. The carriages are saloons with end platforms and are very roomy. Goods trucks follow British practice, but are generally attached singly to the ends of trains. The line rises to an altitude of 7,000 ft. at the Furka Pass, the steepest gradient being 1 in 10.

The stations are simple, in many cases consisting merely of a shed or even an excavation in the hillside. That at Andermatt is an exception, however, for it has fine station buildings, three covered platforms and an engine shed.

J. D. FAGE (Teddington).

A Film in the Making

When I visited the film studios at Welwyn Garden City I saw carpenters at work making the sets before watching the actual production of part of a film. Anything from a fully equipped theatre to an old world cottage can be modelled in full size in the workshops, and in one corner I saw what appeared to be a delicious meal, but was disappointed to find that the good things it included were made of plaster!

On the set a theatre scene was to be taken, and when I arrived the members of the audience, themselves part of the cast of course, were already in their seats. The chief actors then arrived and the scene was rehearsed several times before the producer announced that he was ready. Three cameras were then placed in position for taking views from different angles, and the sound-recording apparatus in a little room at the top of the studio was made ready. In the meantime final instructions and advice were given to the cast by the producer and his assistant, and a few scenic alterations were made.

Then the arc lamps bathed the stage in a flood of amazingly bright light that to me seemed like concentrated moonlight. An assistant standing in front of the set gave the signal to start "shooting" by sounding a clapper three times and then dropped out of camera range; switches clicked over, and for a few minutes there was dead silence except for the voices of those taking part in the scene.

Suddenly the producer called out "Cut." Lights faded out, for the current consumption of the arc lamps is very high and their heat is unpleasant; the cameras were switched off and their operators began to replace the used film. Something was wrong with the set. Workmen were summoned and 10 minutes later the trouble had been corrected, lights again were switched on, and filming was restarted.

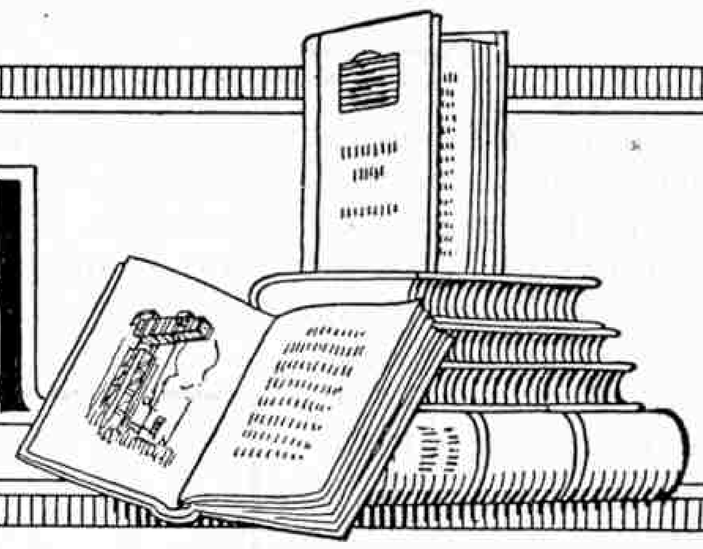
This time the scene was nearly completed, but was then stopped to allow some alteration to be made in the acting. The new version was rehearsed and filming began once more, to be carried through successfully, both for sound and camera.

This was not the end of the scene, however, for some of the theatre seats were then removed to allow close-up views to be taken, after which "stills" were photographed with an ordinary camera. The entire scene lasts only a few minutes in the finished film, but it took nearly three hours to shoot.

The films were developed as soon as they were finished, ready for showing in the private cinema of the studio.

P. WARE (Hoddesdon).

Books to Read



Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/– for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"Further Heroes of Modern Adventure"

By T. C. Bridges and H. H. Tiltman
(Harrap. 7/6 net)

The authors have already written four books dealing with modern adventure, but have found no lack of material to enable them to compile a fifth, for the spirit of adventure thrives as strongly as ever. Like its predecessors, this volume contains stories of recent exploits of travellers and explorers in all parts of the world, and is a wonderful record of heroism and resource in dangerous and unusual situations.

In it we read of Sven Hedin's journeys across deserts in unknown Asia, and of explorations by Dr. Baker in the depths of caves. Captain Benyon's race by car to India in an attempt to beat an ocean liner; the experiences of Reginald Campbell in the snake-haunted teak forests of Siam; Douglas Carruther's hunt in Arabia for the oryx, which is probably the fabled unicorn; and Major Cheeseman's tracing of the Blue Nile from its source in Abyssinia, form other absorbing sections of the book. Further thrills are provided by stories of encounters with man-eating tigers, of a visit to the lair of Chinese pirates, and of other amazing adventures in unknown lands and seas and in the air. The book is well illustrated by means of 30 full-page plates.

Alligator hunting in America. From "Further Heroes of Modern Adventure," reviewed on this page.

"Gradients of British Main Line Railways"

(Railway Publishing Company Ltd. 5/–net)

The demand for copies of this publication, which was reviewed in the "*M.M.*" last September, was so great that a second edition has already become necessary. In this some useful revisions have been effected. An additional page has been inserted dealing with the G.W.R. line from Salisbury to Bathampton, and an up-to-date touch is given to the book by the transference of the gradient profiles of the Midland and Great Northern Joint Railway from the joint section to that dealing with the L.N.E.R., in view of the fact that this company is now working the line. As in the first edition, paper of different colours is used for the profiles for each group, the joint lines and the Irish railways. This paper is suitable for the addition of notes.

"Claudius the Bee"

By John F. Leeming. (Harrap. 5/– net)

This is an unusual story that will delight everybody, youngsters and grown-ups alike. It is set in the world of bees, into which is introduced Mr. Tawney, who was kind to a bumble bee, and in gratitude was invited to the nest in which it lived and given a drink that made him shrink until he was only about half an inch in height. In this form he was entertained at a banquet, and thoroughly enjoyed himself with Claudius, the master of the nest, and his new friends. Unfortunately that moment was chosen by Black Michael, a rival of Claudius, to let in a gang of bandit wasps by a secret entrance. Mr. Tawney and Claudius are captured by this black villain, but the former manages to free himself and in the end he saves the nest from destruction.

Before Mr. Tawney creeps into the cavernous interior of his discarded clothes and drinks the mixture that restores him to his normal size, he learns many interesting things about the creatures of the world into which he penetrates, and takes part in a variety of amusing episodes.

The book is attractively written, and the reader will find it difficult to put it down until he has read it from beginning to end. Its interest is greatly increased by the amusing drawings that appear on almost every page.

"The Untold Story of Exploration"

By Lowell Thomas. (Harrap. 8/6 net)

All "*M.M.*" readers who delight in stories of exploration in distant parts of the world will enjoy this book. The author has chosen as his subject the achievements of travellers who are not very well known, but nevertheless lived exciting and romantic lives; and he throws an interesting light on many parts of the world that even yet are not familiar to us.

The book begins with the story of Chang K'ien, the first Chinese explorer, who ventured into the wilds of Central Asia more than 2,000 years ago. Then come the adventures of Hans Schiltberger, a Bavarian who travelled in Siberia in the 15th century. Juan Fernandez, sometimes spoken of as the first Robinson Crusoe; Captain Bertram Thomas, who in 1930 crossed the great Arabian Desert; Pytheas, the Greek of Marseilles, the first traveller in the Arctic Regions; and William Dampier, the buccaneer who became a great explorer, are others whose deeds are described.

The book is illustrated by 12 full-page plates.

"Ships of the Narrow Seas"

By Edmund Vale

The romance and interest of the sea is not confined to the great ships that cross the oceans, but also can be found in the vessels that maintain cross-channel services around our shores. The men who direct these have to contend with storms, strong tidal currents and winds, and must find their way through tortuous and often crowded shipping lanes leading to their ports. How their work is carried on is well explained in this interesting booklet, published by the L.M.S.R., dealing with the cross-channel services.

The story begins with a general account of cross-channel practice and then deals in turn with the Irish Mail route between Holyhead and Dublin, with the Heysham-Belfast and Stranraer-Larne services, and with the steamers that ply on the Clyde and on the lakes of Scotland and the Lake District. The vivid descriptions given by the author of scenes on the bridge, in the engine rooms and in the cabins of the vessels engaged in these services will delight all who have been, or propose to be, passengers in them; or indeed all interested in the sea.

The booklet can be obtained free of cost by sending a postcard to the Advertising and Publicity Department, L.M.S.R., Euston House, London, N.W.1.

"The Modern Book of Lighthouses, Lightships and Life-boats"

By W. H. McCormick. (A. and C. Black. 5/- net)

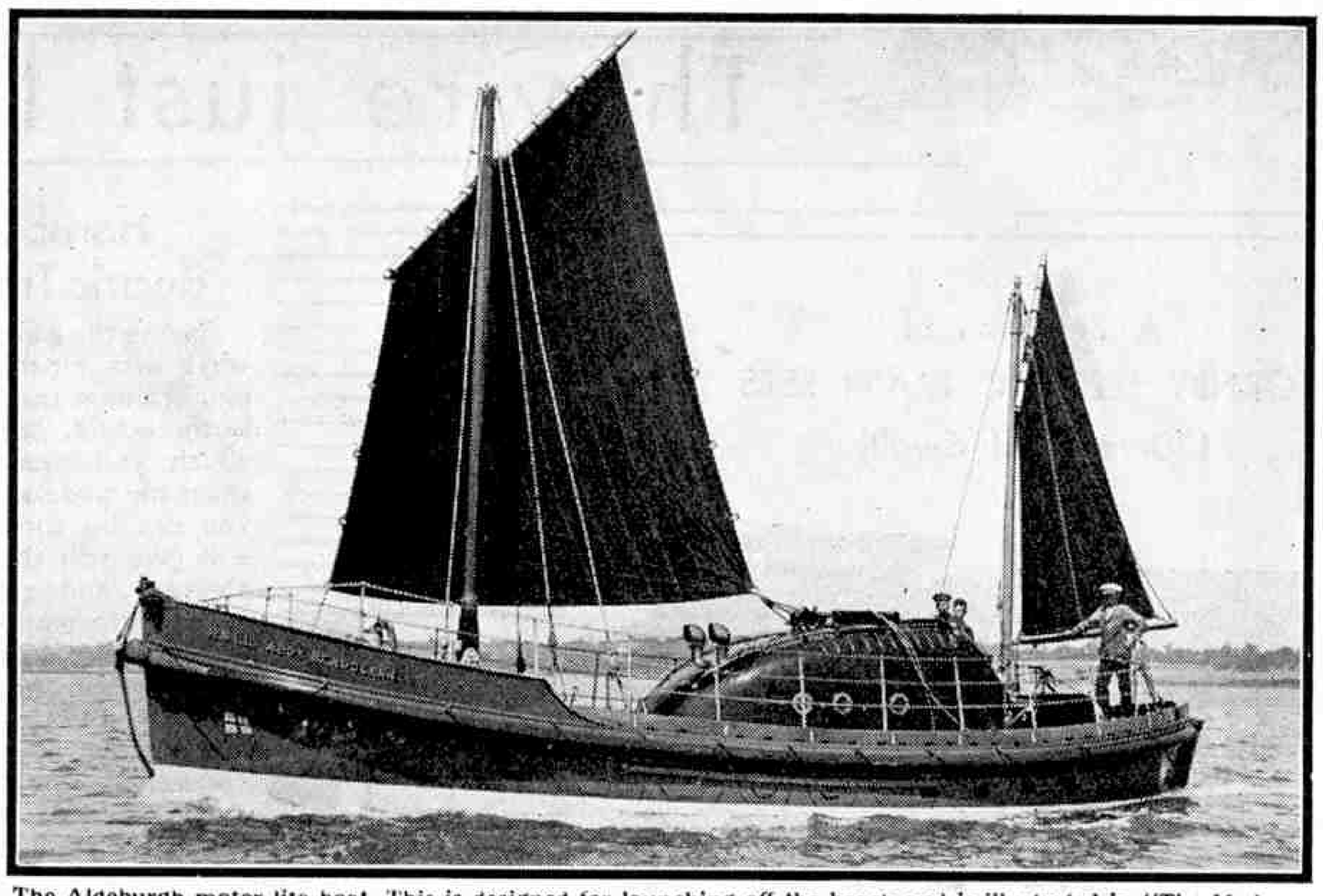
The story of the lighthouses and lightships that guard our shores, and of the life-boats that put out in the wildest weather to save the lives of sailors in distress, is of absorbing interest, and it is told fully in this fascinating book by the Editor of the *"Meccano Magazine."*

Lighthouses occupy a great part of the volume. After tracing their development from the crude lights of early days, the author turns to the lighthouses of the British Isles, explaining how these are controlled and worked, and giving stirring accounts of the building of several of the most famous of them. Chief among these is the Eddystone, probably the most famous lighthouse in the world; and the story of the four towers that have been erected on the Eddystone Rock illustrates the dangers and difficulties of lighthouse construction on an exposed and often wave-swept rock. Other British lighthouses the building of which is described include the Bishop, Longships, Lizard, Wolf, Bell Rock, Skerryvore and Fastnet. All these are dealt with fully and in the most interesting manner, and graphic descriptions are given of exciting incidents connected with them. Passing farther afield, the author devotes chapters to some of the more famous lights along the United States coast, to French lights, and to the famous Rothersand lighthouse at the mouth of the Weser River, Germany, which was built on a foundation of shifting sand. Another chapter deals with lightships and their work.

A section of special interest deals with the mechanism by which the warning beams are sent out from lighthouses and lightships, and with the variety of signals used during fog. Automatic unattended lights that switch themselves on at nightfall and off with the return of daylight are described, and a full account is given of the different types of buoys that mark the channels leading to our great ports. Equally interesting is the description of the use of wireless for guiding ships at sea and in narrow waterways.

The remainder of the book is devoted to the story of the life-boat, one of the greatest romances of the sea. The development of the modern unsinkable life-boat, down to the latest Diesel-engined vessels of the Royal National Life-boat Institution, is described in full, and thrilling accounts are given of many rescues carried out by the heroic members of the Life-boat Service.

The many attractions of this well-written book are greatly increased by its numerous photogravure illustrations. D. G.



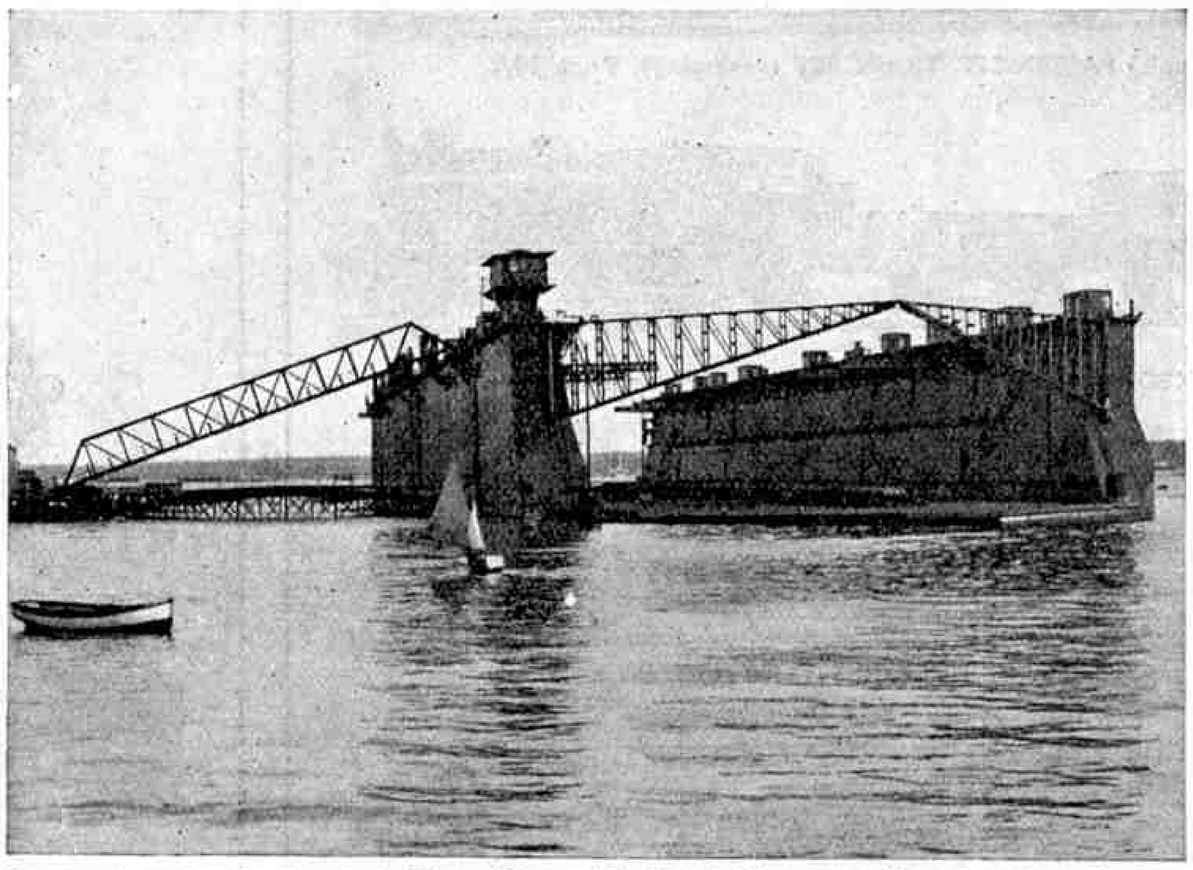
The Aldeburgh motor life-boat. This is designed for launching off the beach and is illustrated in "The Modern Book of Lighthouses, Lightships and Life-boats," reviewed on this page.

"Chiseltooth the Beaver"

By J. W. Lippincott. (Harrap. 5/- net)

Well-told nature stories are always attractive and interesting, and no more suitable hero for a book of this kind could be found than the beaver, Nature's greatest engineer. The author of this volume, who is a distinguished explorer, traces the career of a pair of beavers in a North American creek, who build a new home for themselves and bring up a family, and emphasises well their courage and industry, and their devotion to each other. In the end they are compelled to give way before the advance of Man. The last act of Chiseltooth and his companion is to exercise their natural skill and cunning in repairing a breach in a great dam built to impound a reservoir. They thus save an entire valley from destruction by flood. Then they dramatically disappear, but in honour of their achievement the reservoir is named Beaver Lake.

The book is a fascinating picture of an unusually interesting creature that until recently was in danger of becoming extinct. It is illustrated by a coloured frontispiece and many attractive woodcuts.



The Southampton floating dock. From "Great Scientific Achievements," reviewed on this page.

"The Lion of the Frontier" By John Grant
"Sea-Plane Base" By M. E. Miles
"Flying Dawn" By Dorothy Carter

(A. and C. Black. 3/6 each net)

These three further volumes in the publishers' "Air Adventure Series" are as full of thrills and excitement as those reviewed last month. The scene of *"The Lion of the Frontier"* is the turbulent north west of India, where Colonel Challenger and his son Richard fall into the clutches of a local chieftain notorious for his cruelty. Richard escapes and succeeds in rescuing his father after a dramatic attack on the chieftain's stronghold, in which R.A.F. machines give valuable unofficial aid. Aeroplanes play a greater part in *"Sea-Plane Base,"* which deals with the efforts of a gang of international spies to blow to pieces a wonderful new British sea-plane undergoing secret trials from a base in the Hebrides. Their evil intentions are thwarted, after a breathless chase through burning heather and a perilous voyage in an open boat, by three determined youngsters who stumble on their headquarters by chance during a motor-boat holiday. *"Flying Dawn"* concerns the adventures of two enthusiastic girl flyers during a trip abroad by air. One of them is kidnapped, but after many adventures and misunderstandings is rescued by her companion, who makes effective use of her machine in her pursuit of the kidnappers.

Black and white illustrations by Alfred Sindall illustrate each of the books.

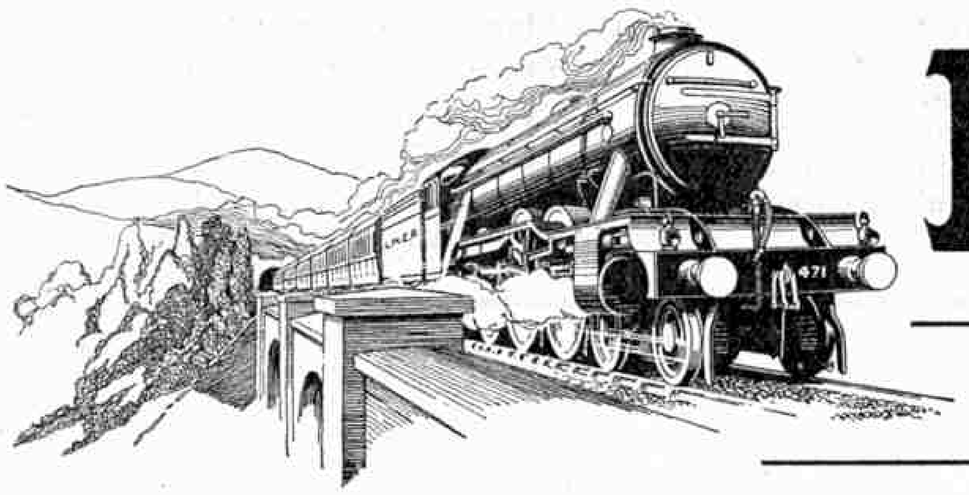
"Great Scientific Achievements"

By Professor A. M. Low

(Nelson. 3/6 net)

Professor Low has chosen varied and interesting subjects for treatment in this book, which contains non-technical accounts of recent great achievements in science and engineering. The erection of great buildings, the *"Queen Mary"* and feats of salvage begin the story, which is continued with descriptions of wonderful bridges and floating docks, and accounts of the manner in which the forces of nature have been harnessed to give us electric light and power. The wonders of wireless, the conquest of the stratosphere and travel across the Atlantic Ocean by air are the subjects of other interesting chapters, and interesting details are given of the coming of science into farming. The many-sided story is completed with an account of the gyroscope and its uses at sea and in the air, and special attention is given to the Iraq pipe-line and the Mersey Tunnel.

The book is vividly written and is easy to read, but is packed full of useful information. It is illustrated by 12 plates.



HORNBY

ELECT
AN
CLOCKW

They're just like

Hornby Electric Trains

Playing the game of railways with Hornby Electric Trains is the best fun in the world. No matter which you choose from the many models available, you can be sure that it will give you the utmost pleasure and satisfaction.

The performance and durability of the Hornby Electric Trains place them in a class entirely of their own. Each locomotive is fitted with a powerful motor that will haul heavy loads at high speeds, always under perfect control.

Hornby Train Sets are available at pri
Electric models and 4/11 to 6

A selection from
HORNBY LOC

ELECTRIC MODELS

EM120 (20-volt) or EM16 (6-volt) Locomotive (non-reversing) Price **8/6**

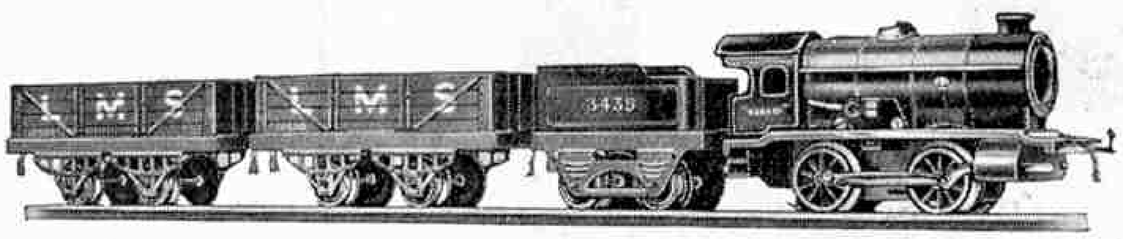
EO20 (20-volt) Locomotive (reversing) Price **22/–**

E120 (20-volt) Tank Locomotive (reversing) Price **24/–**

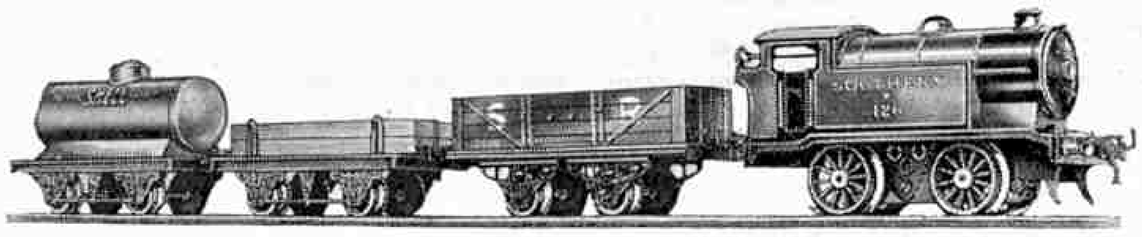
E120 (20-volt) Special Tank Locomotive (automatic reversing) Price **30/–**

E220 (20-volt) Special

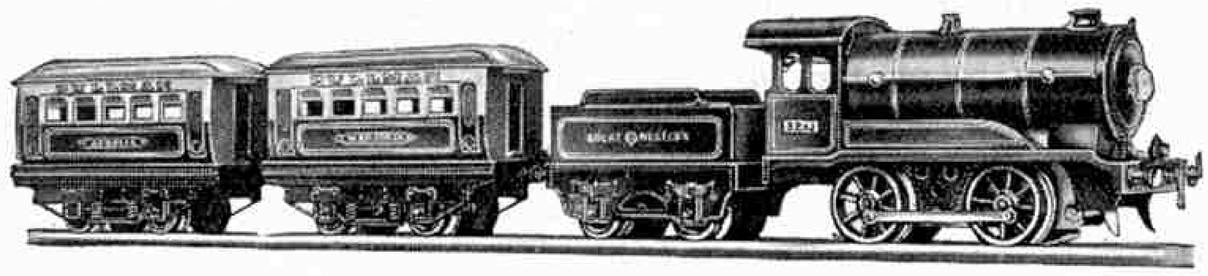
A Selection of HORNBY ELECTRIC TRAIN SETS (20-volt and 6-volt)



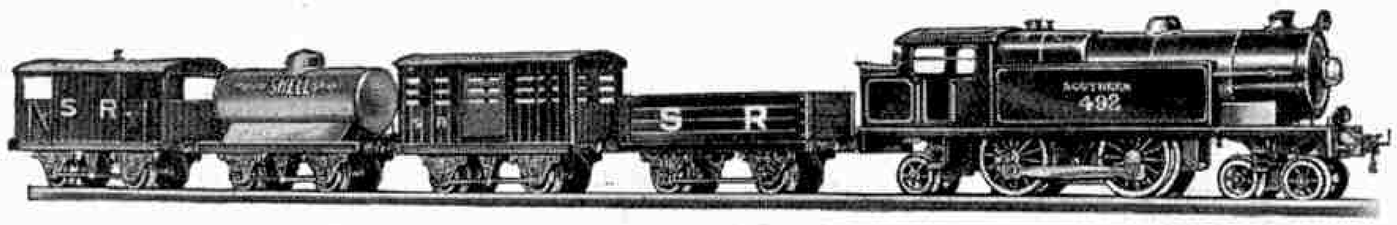
EM120 (20-volt) or EM16 (6-volt) GOODS TRAIN SET (non-reversing). Price **15/–**



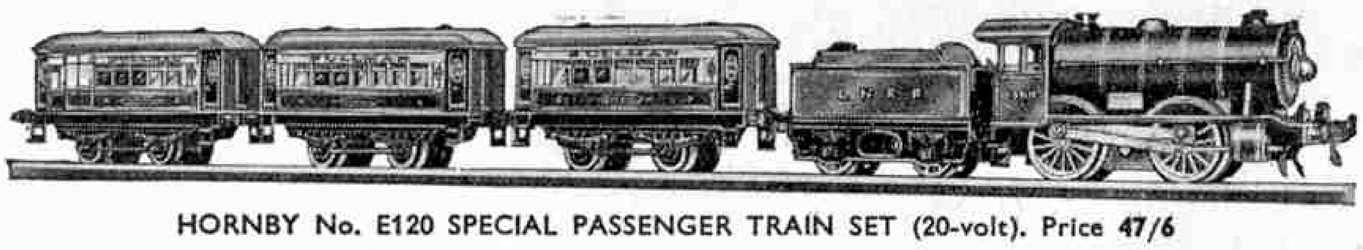
EM320 (20-volt) or EM36 (6-volt) TANK GOODS TRAIN SET (reversing). Price **24/–**



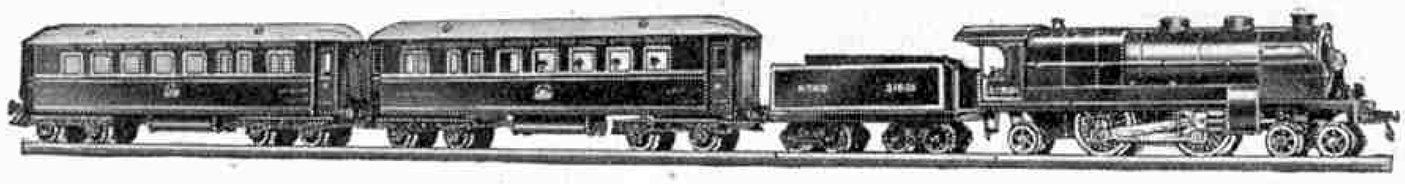
HORNBY No. EO20 (20-volt) PASSENGER TRAIN SET (reversing). Price **30/–**



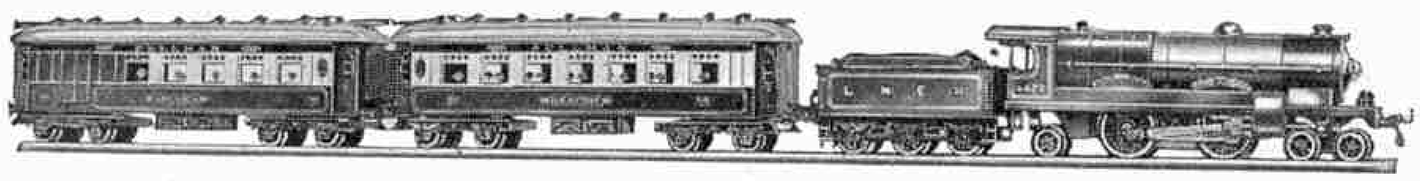
HORNBY No. E220 (20-volt MIXED GOODS TRAIN SET (automatic reversing). Price **47/6**



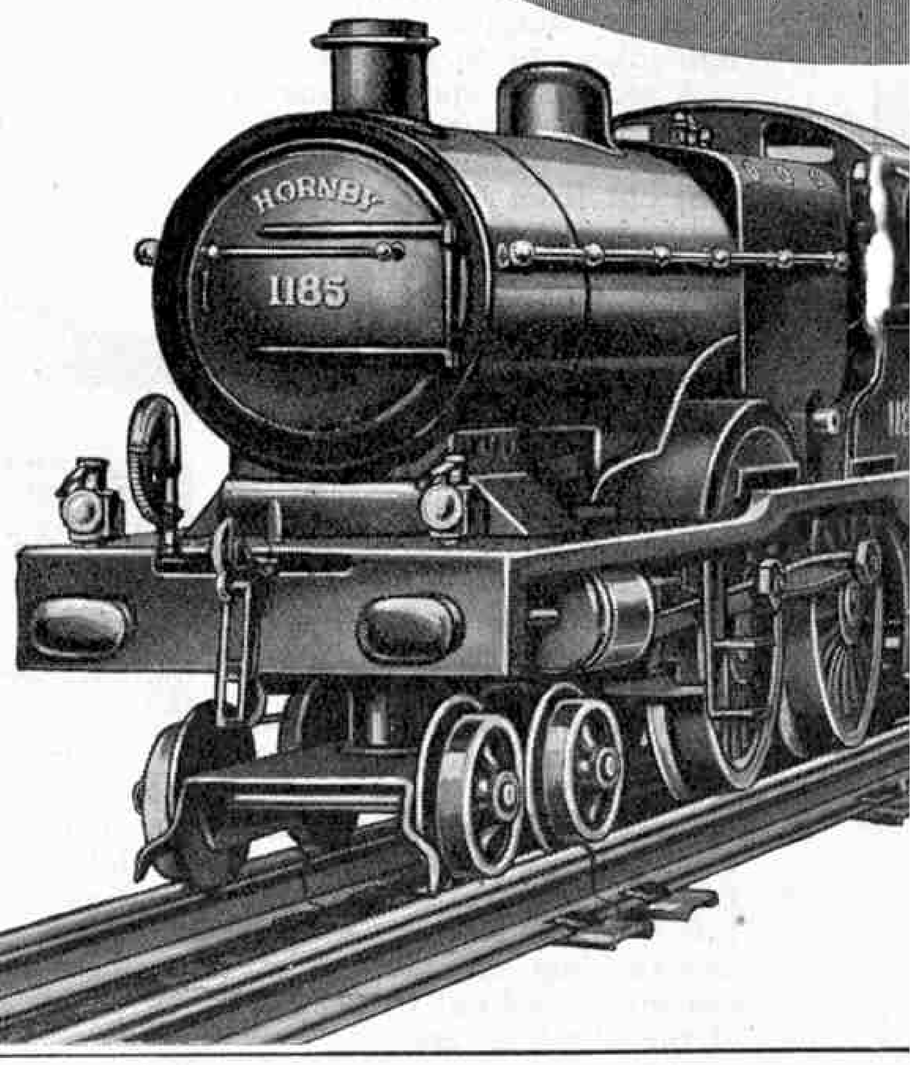
HORNBY No. E120 SPECIAL PASSENGER TRAIN SET (20-volt). Price **47/6**



HORNBY No. E320 (20-volt) RIVIERA "BLUE" TRAIN SET (automatic reversing). Price **67/6**



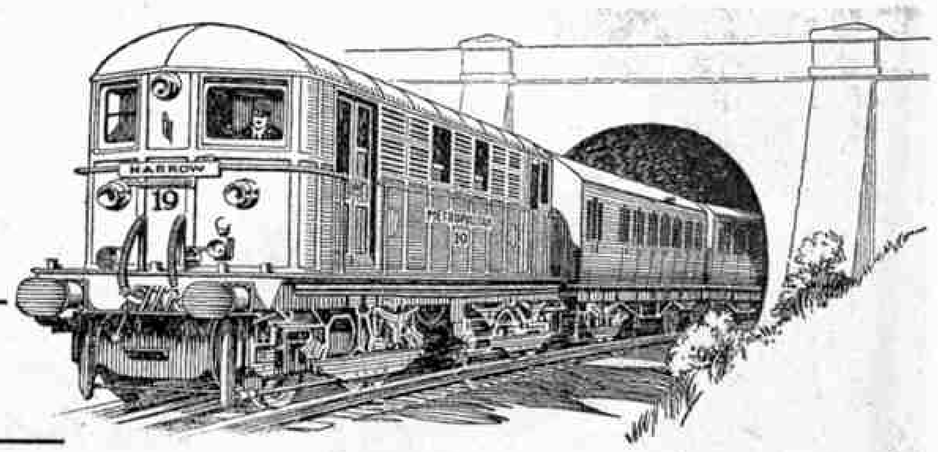
HORNBY No. E320 (20-volt) PULLMAN TRAIN SET (automatic reversing). Price **72/6**



MECCANO LTD. - BINNS

CTRIC
ND
KWORK

TRAINS



real trains, boys!

Hornby Clockwork Trains

Hornby Clockwork Trains have the longest-running spring-driven locomotives in the world. The motors fitted are of the highest quality, being perfect mechanisms with accurately-cut gears that ensure smooth running.

The splendid range of Rolling Stock, all fitted with patented and exclusive automatic couplings, and the wealth of Accessories, make the Hornby System complete in every detail.

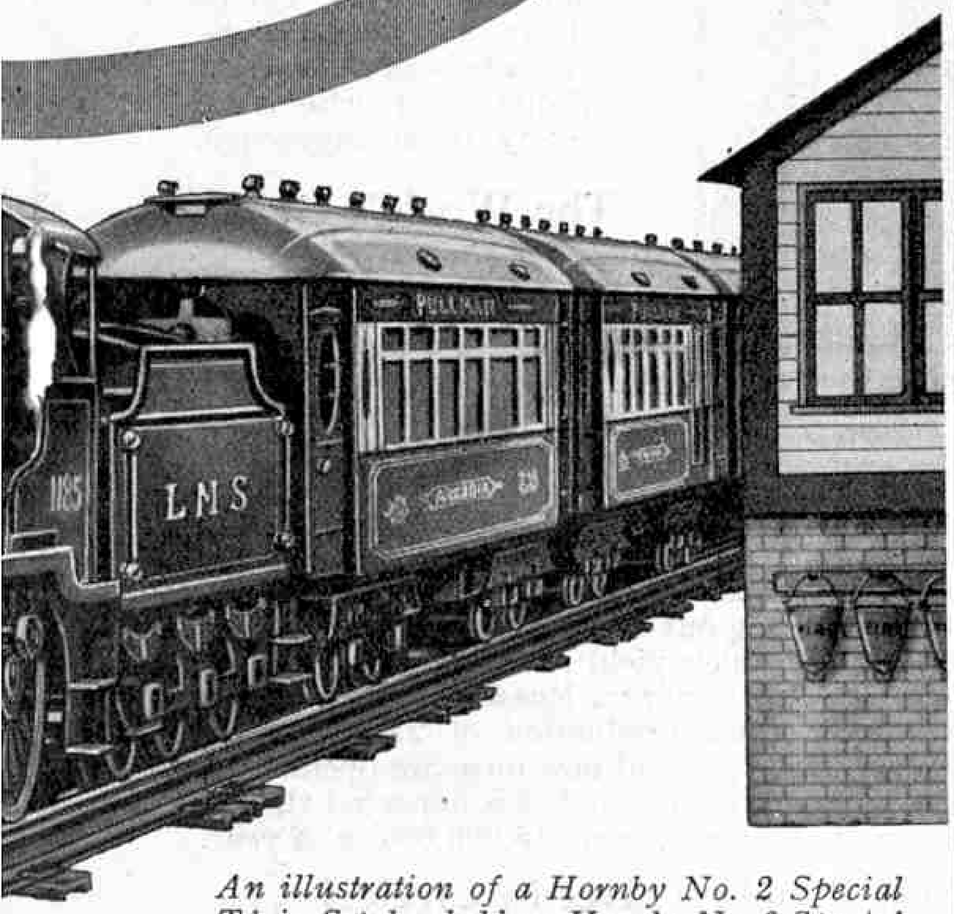
: prices ranging from **15/–** to **75/–** for
:o **65/–** for Clockwork models.

om the range of
.OCOMOTIVES

Tank Locomotive (automatic reversing) Price **32/6**
E220 (20-volt) Special Locomotive (automatic reversing) Price **37/6**

CLOCKWORK MODELS

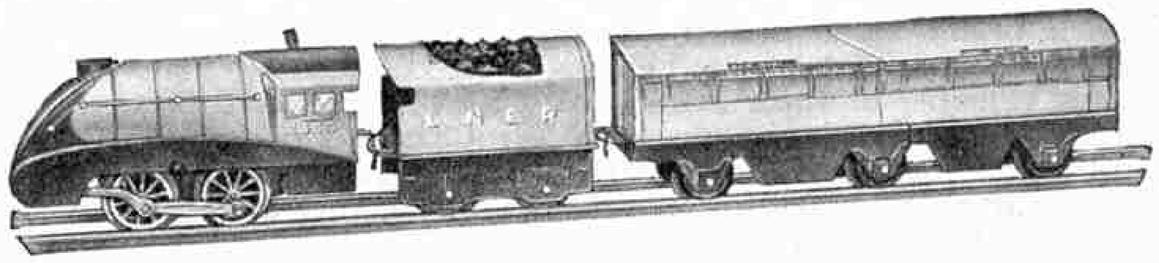
M1/2 Locomotive (reversing) Price **4/6**
M3 Tank Locomotive (reversing) Price **7/6**
No. O Locomotive (reversing) Price **10/6**
No. 2 Special Locomotive (reversing) Price **27/6**



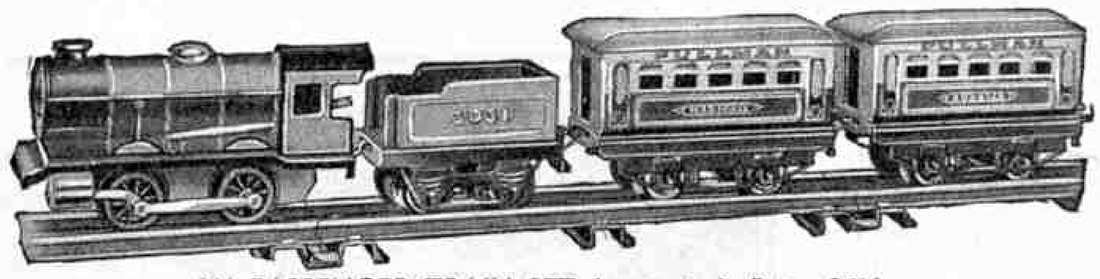
An illustration of a Hornby No. 2 Special Train Set, hauled by a Hornby No. 2 Special Locomotive, the latter being a true-to-type model of the real L.M.S.R. Standard Compound Locomotive.

S ROAD - LIVERPOOL 13

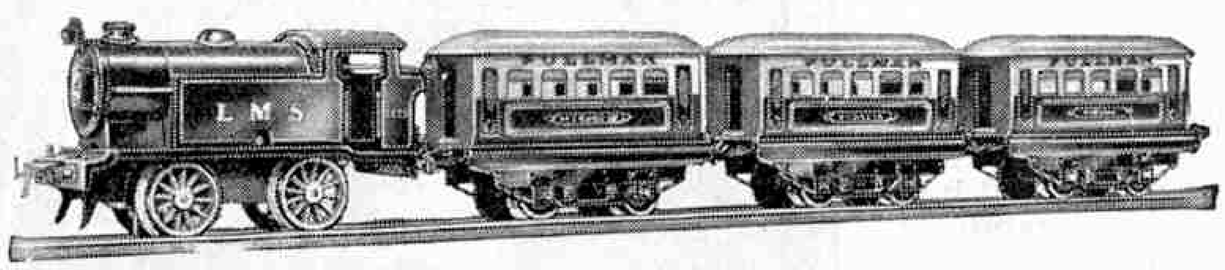
A Selection of HORNBY CLOCKWORK TRAIN SETS



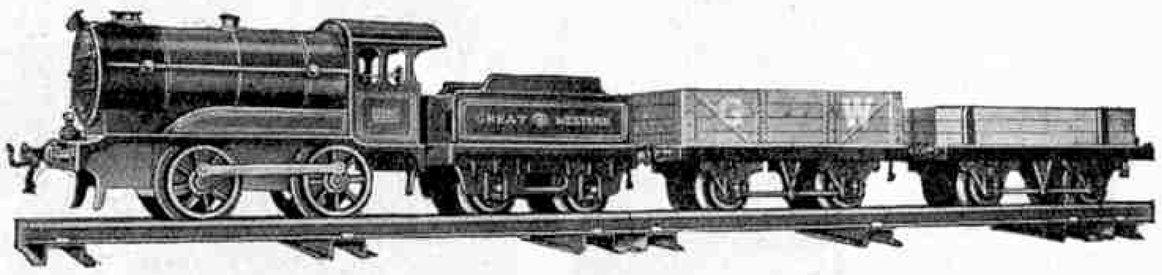
No. O "SILVER JUBILEE" CLOCKWORK PASSENGER TRAIN SET, L.N.E.R. (non-reversing). Price **7/6**



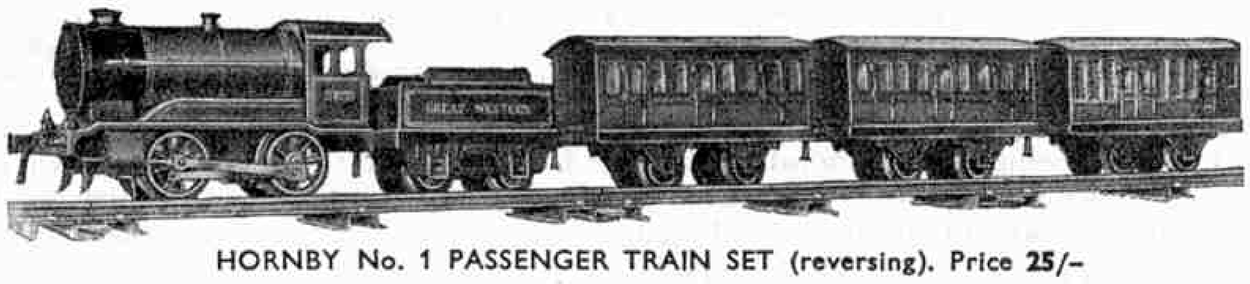
M1 PASSENGER TRAIN SET (reversing). Price **8/11**



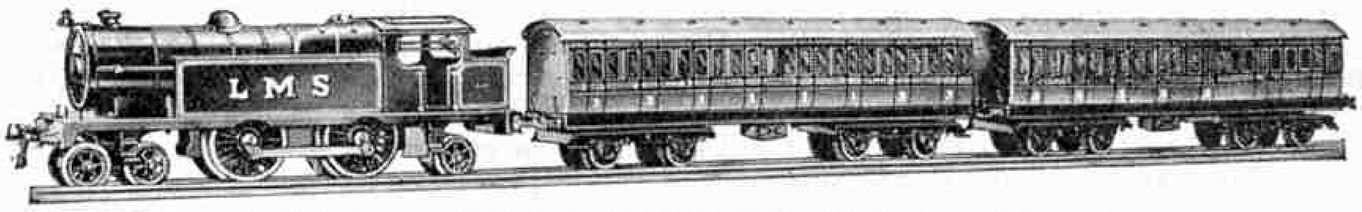
M3 TANK PASSENGER TRAIN SET (reversing). Price **13/9**



HORNBY No. O GOODS TRAIN SET (reversing). Price **17/6**



HORNBY No. 1 PASSENGER TRAIN SET (reversing). Price **25/–**



HORNBY No. 2 TANK PASSENGER TRAIN SET (reversing). Price **40/–**

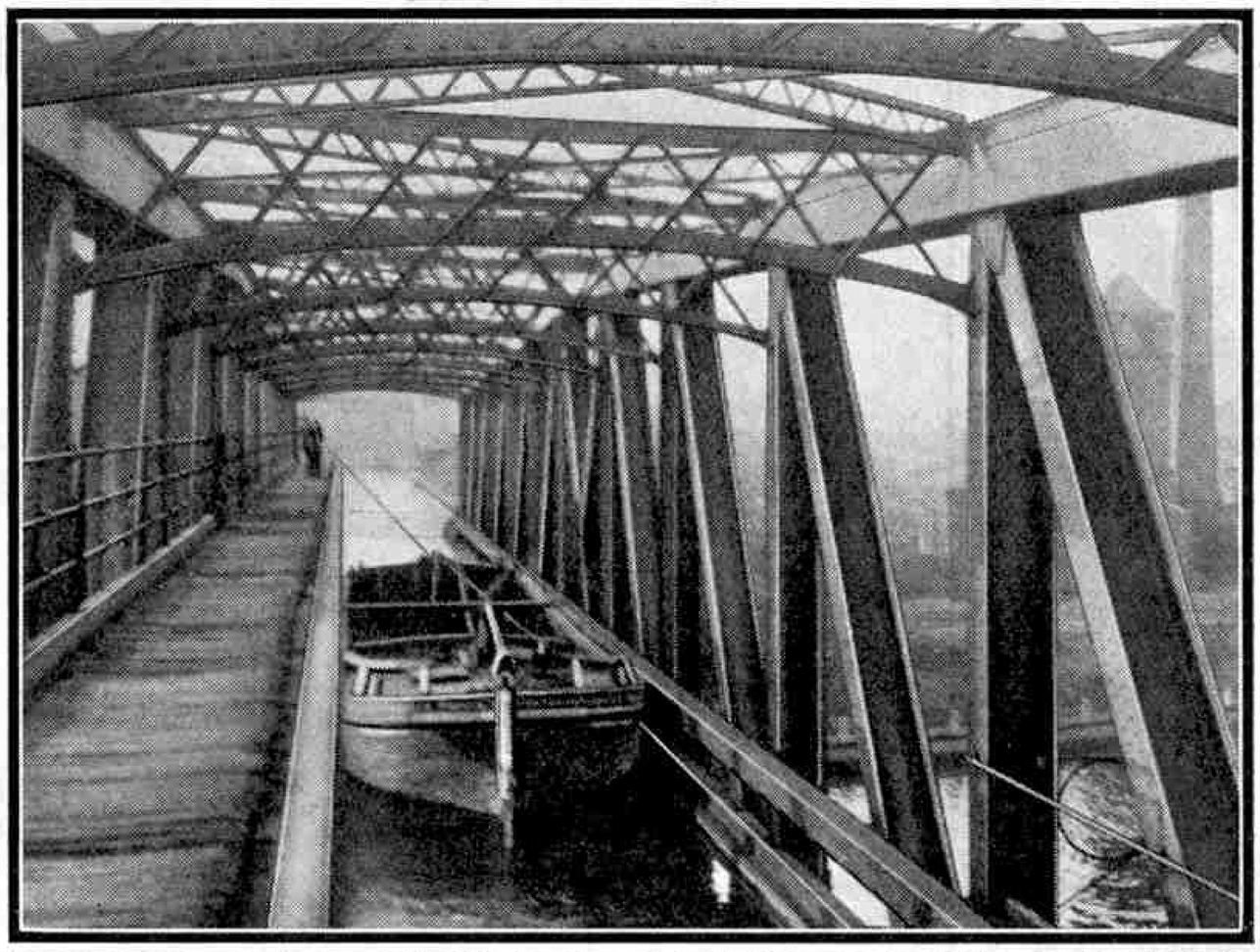
HORNBY No. 3C PULLMAN TRAIN SET (reversing). Price **62/6**

Diamonds from Sugar

In view of the value that is attached to gems, it is scarcely surprising to know that repeated efforts have been made to make the more valuable of them artificially. These efforts have been conducted on genuine scientific lines. Sir Charles Parsons, the inventor of the turbine, was one of those interested in this subject, and he spent over £20,000 in experiments on making diamonds that continued for 24 years.

The diamond of course has the greatest attraction for artificial gem makers, but so far they have been unable to produce a rival to the natural product, which is a crystalline form of carbon. Artificial diamonds have been made, but they were almost microscopic in size and of no value, although they were costly and difficult to produce. The most famous experiments were made by Moissan, a French chemist who dissolved pure carbon from sugar in molten iron at a temperature of about 7,000 deg. F. and plunged the mass into molten lead in order to cool it. This seems a curious method of cooling, but lead melts at a temperature of little more than 600 deg. F., and thus there was a fall in temperature of more than 6,000 deg. F. Water could not be used for this purpose, for the layer of steam that would have been formed would have prevented the mass of iron from cooling.

The result of plunging the iron into molten lead was to solidify its outer surface, and as this shrank it exerted a pressure up to 20 tons per sq. in. on the carbon in the interior, causing it to crystallise. Even this high pressure was insufficient, and it seems as if diamonds will never be made until the conditions of temperature and pressure existing deep under the surface of the earth can be reproduced.



An unusual view of a barge crossing Barton Aqueduct, which carries the Bridgewater Canal across the Manchester Ship Canal. The Aqueduct is turned through a right angle when necessary to allow large vessels to pass up and down the Ship Canal. Photograph by A. Phillips.

Making Artificial Gems

Efforts to make rubies, sapphires and other precious stones have been more successful, and artificial gems to the value of £20,000,000 are now produced annually. Rubies and sapphires consist of the oxide of aluminium known as corundum, which in crystalline form is second in hardness only to the diamond. Corundum is colourless and the ruby owes its colour to the presence of small quantities of chromium. Artificial rubies are built up by melting the tip of a piece of corundum by means of a small, intensely hot flame, and blowing powdered corundum mixed with a little chromium on to the molten drop. When this is allowed to cool slowly, and is cut, a stone that cannot readily be distinguished from a natural ruby is obtained.

Artificial sapphires are made in a similar manner, substituting titanium for chromium, and artificial or "oriental" emeralds also can be produced from corundum by adding a larger proportion of chromium than when making artificial rubies and heating to a different temperature.

The Earliest Known Englishman

Until recently the honour of being the earliest known inhabitant of England belonged to Piltdown Man, a being who is thought to have lived about a million years ago near what is now Piltdown Common, Sussex. The only traces of him that we possess are a few of the bones of his skull that were found in a gravel bed. These were sufficient to enable us to picture him in some degree, however, and we know that his head approached that of modern man in shape and in other respects, while his jaw was like that of a chimpanzee.

Now Piltdown Man is in danger of losing the honour that so far has been accorded to him, for two bones of the skull of what may have been an earlier inhabitant have been discovered at Swanscombe, Kent. The first was found in June 1935 in a seam of gravel at a depth of 24 ft. below the surface, and the second was found in the same seam in March of this year. The two bones fit together perfectly and are sufficient to show that Swanscombe Man was more primitive than Piltdown Man, for his skull was smaller and lower in the crown and his brain was not so well developed. The conclusion from this is that he lived at an earlier date, and thus he was the earliest Englishman of whom we have any direct knowledge.

The World's Gold Output

The gold reef on which Johannesburg stands is believed to be an immense golden bowl, the rim of which touches the surface in places, while the bottom may be more than 10,000 ft. deep. This bowl probably is the dried-up bed of a great inland lake of prehistoric times, into which a river flowing from the north west carried gold in suspension and solution.

About one-third of the gold dug out of the earth annually comes from the mines of the Rand, which yield about 10,500,000 oz. a year. The next greatest output comes from Russia, which produces 4,300,000 oz. of the world's total production of 27,500,000 oz. As existing mines are carried deeper and new ones are opened the amount of gold being won is increasing, and it is expected that in four years the Rand output alone will reach 15,000,000 oz. a year.

Why Do Lost People Travel in Circles?

It has long been known that people who are lost in forests or deserts show a tendency to walk in circles instead of going straight ahead. This has been tested by experiments with blindfold people who were asked to walk straight across a large and level field. None of them succeeded, their paths invariably being spirals. An interesting variation of these experiments was carried out on ground covered with a light fall of snow, when the tracks were readily seen to be spiral in form, some curving to the left and others to the right. Even blindfold swimmers in similar trials

followed spiral courses instead of swimming along straight lines.

These experiments seem to point to the existence of some kind of steering mechanism in the body that automatically causes people to travel in circles instead of straight lines when it is allowed full control, and it is interesting to find that animals appear to possess a similar mechanism that makes them move in spiral paths when unable to rely upon their senses.

A Reversing Waterfall in the Arctic

At the mouth of the St. John River, New Brunswick, there is a barrage of rock that has transformed the estuary into a reversing waterfall. When the tide is low the water of the river pours into the bay, and the flow is in the reverse direction at high tide.

This reversing fall was thought to be unique, but another has now been discovered in a fjord in Baffin Land. A group of rocky islets stretches across the narrowest part of the fjord, and at low tide the water that has been pent up in the inner reaches pours down the rocks in a foaming cataract. When the tide rises the levels become equal and the disturbance subsides. There is peace for only a few minutes, however, for as the tide rises further the direction of the current is reversed and the water flows inward in a turbulent mass of great waves.

The constant motion of the water prevents the formation of ice, in spite of the severity of the climate of Baffin Land, and the Eskimo name for this reversing fall means "The Place That Never Freezes."

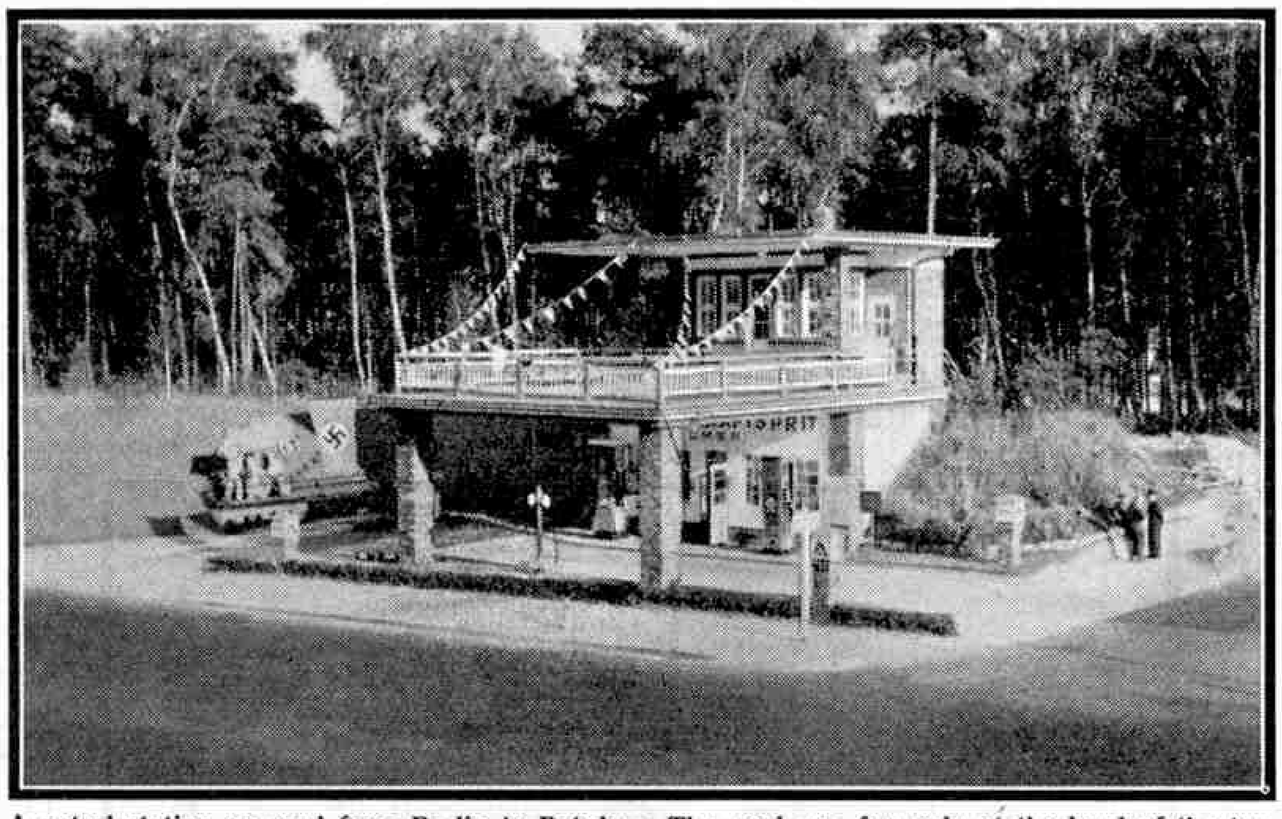
The Horse Power of the Sun

Every square yard of the Sun's surface radiates 75,000 h.p., and the nearest approach to this intensity that is commonly found on Earth is the one horse power per square inch, or 1,300 h.p. per square yard, exerted on the piston area of the average motor car engine. In spite of the best efforts of scientists and engineers, none of the Sun's energy is used directly for producing power, except in the few plants in which sunlight is concentrated on boilers by means of mirrors, as in the device described and illustrated on page 401 of the "*M.M.*" for July last. When we burn coal or oil we are using Sun power indirectly, however, for these fuels are the result of the Sun's activities in past ages, and windmills and hydro-electric stations depend upon it for their power.

The continuous flow of energy from the Sun is stupendous. On a clear day in June the amount falling on the County of London is 352,000,000 h.p., or 88 times the maximum that can be developed by Niagara Falls, and this of course is only a minute fraction of the total that falls upon the Earth. Even allowing for absorption of the Sun's rays by the atmosphere, they carry about 3,000,000 h.p. to every square mile of the Earth's surface illuminated by them. Most of the Sun's energy streams away unheeded into space, however, for the planets intercept only a small proportion of it, the Earth's share being one part in 2,200 million.

Clock that Tells Time to Come

The lower illustration on this page shows an ingenious method that has been adopted by a French shopkeeper for telling his customers how much longer they have to wait before his shop is open. When he leaves for lunch or any other purpose he fixes a novel clock in a position where it can be seen by those approaching the door. This clock does not record the minutes that have passed, but those that are to come. Thus if the owner is to be away for an hour, he sets it to show the number 60 in the small square, and the number decreases minute by minute until zero appears, and with it the shopkeeper—if he is punctual.



A petrol station on road from Berlin to Potsdam. The road was formerly at the level of the top storey of the building, but when a new road was made at a lower level another storey was added under the original structure. Photograph by J. M. S. Risk.

Fire Fighting in San Francisco

The thrilling spectacle of fire engines dashing through the streets at high speed, with bells clanging and all the traffic held up to allow their passage, will no longer be seen in San Francisco, for fire-fighting mains delivering water at high pressure have been installed in the city. It is therefore unnecessary to take pumps to a fire; instead the firemen connect their hoses to the hydrants of the special mains, and are immediately able to send jets of water as high as the tops of twelve-storey buildings.

The new system is entirely distinct from that providing the normal water supply. It includes a main storage reservoir with a capacity of 10,000,000 gal., and two intermediate reservoirs, from which the fire-fighting mains are directly supplied, and these are at heights giving pressures ranging up to 150 lb. per sq. in. The mains vary in diameter from 12 in. to 18 in. and they surround the central business quarter of the city and cross it in all directions.

One reason for the creation of an independent water system is the possibility of earthquakes that may disorganise ordinary services. Much of the destruction of the famous earthquake of 1906 actually was due to fires that broke out when buildings crashed to the ground, and for some time raged practically unchecked because of the failure of the water supply system. Even if the special mains are broken in any future disaster, an independent supply of water is assured from pumping plants built on the shores of San Francisco Bay. These are entirely self-contained, for sufficient oil to keep their pumps in operation for 96 hours is stored in underground steel tanks, and reserves of fresh water for the boilers are kept in special concrete reservoirs. Huge wells also are being constructed at various points in the city. Each will hold 75,000 gal. of water, which will be available if ordinary supplies are cut off by the destruction of the mains.

A novel clock in a French shop. The figures in the small square gives the number of minutes to wait before the shop is opened. Photograph by Mrs. J. Williams.

Automatic Gun Detector

It is impossible to take a gun or any concealed metal weapon or tool into the Alcatraz Prison, in San Francisco Bay. Any attempt to do so would be detected at once, not by searchers, but by an automatic device.

The gun detector is electrical in action, and consists of three loops of wire hidden in the framework of a door. High voltage current is passed through the middle loop, inducing currents in the two outside loops, and all the circuits are carefully balanced. The introduction of any metallic object, such as a gun, a knife or a file, disturbs the balance and causes current to flow through an alarm device. Alternatively the current may be made to switch on a light, and persons entering the prison can be searched without knowing that they are being examined.

A Million Inches of Ruling on a Glass Screen

The largest half-tone screens in the world are nearly 5 ft. in diameter. There are only three of them, and they are used in one of the largest cameras ever made for the production of half-tone blocks. Blocks of this kind are used in printing illustrations similar to those in the "Meccano Magazine," and the screen breaks up the picture into the dots of various sizes and shapes that render light and shade.

Each screen consists of two sheets of glass ruled with parallel lines and placed face to face, so that the lines of one sheet are at right angles to those of the other; and there are more than a million inches of ruling on a single screen.

How to Photograph Competition Models

Making Sharp Pictures with a Box Camera

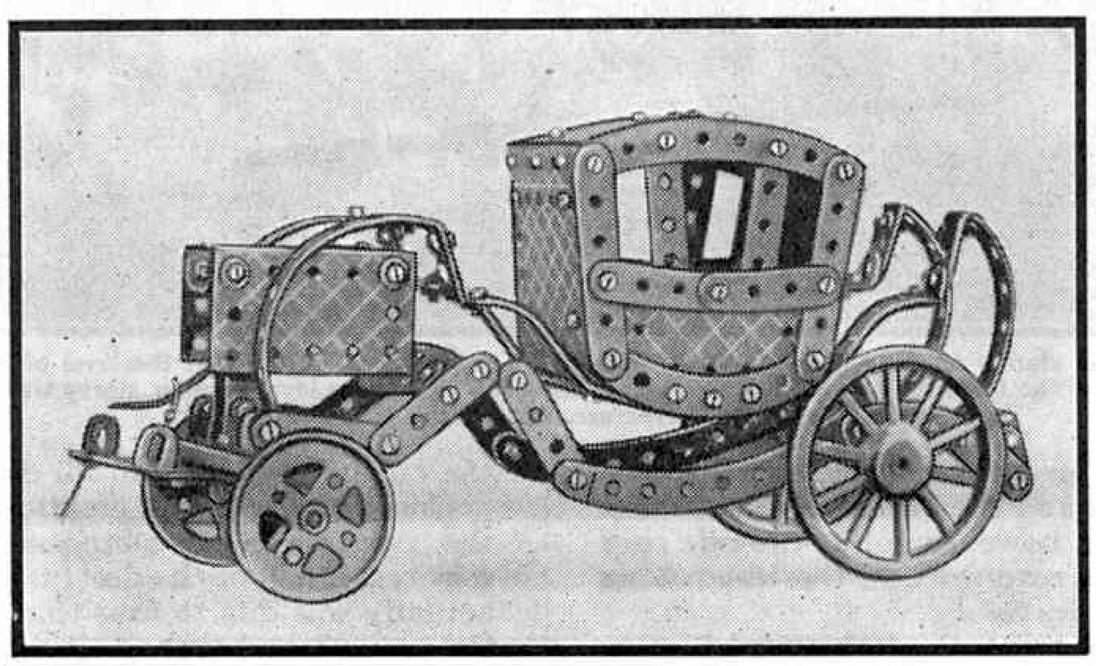
NOW that the long dark evenings are here again hundreds of Meccano model-builders will be busy building models for entry in the competitions announced each month in the Magazine. When a suitable model has been built, the next step is to send details of it to "*M.M.*" headquarters in Liverpool in order that the judges of the contests in which it is entered can give it consideration. For this purpose drawings may be made of it, or a photograph can be taken.

It is not easy to make drawings of a Meccano model that will give the judges a clear idea of its design and how it is built. A photograph therefore is much more satisfactory, and fortunately it is easy to take suitable photographs with the most simple cameras, such as a Kodak Brownie or any other camera of this kind, provided that a few elementary precautions are taken.

A good photograph to be used in an entry in a model-building competition should not be too small to show the model itself distinctly. It must be free from dense shadows on the one hand, and from high lights on the other and, above all, it must be sharp. Examples of really good photographs in which all these features are present are the illustrations on this page and the upper illustration on the opposite page.

It may at first appear difficult to obtain a photograph possessing these qualities with a box camera, but it is really quite easy as the examples illustrated here prove. Those on this page and that at the foot of the opposite page were all taken with a Kodak Brownie box camera under conditions likely to be encountered by the average boy in his own home, and were specially prepared to show what can be done with simple cameras of the fixed focus type.

A great fault with most photographs taken with box cameras is that the image is too small to show the details clearly. This is due to the fact that these cameras are of what is known as the fixed focus type, in which the lens will not focus sharply any object nearer than about 8 ft. This distance is too great to give a reasonably large image of an average model, and in order to increase the size it is necessary to work nearer to the model. Unfortunately, if this is done the resulting picture is all blurred, through being out of focus. The difficulty can easily be overcome, however, by fitting over the regular lens a simple supplementary lens, known as a portrait attachment. With the aid of a portrait attachment the camera will focus sharply objects placed as close as 3 ft. from the lens, and will give a large image. Such attachments suitable for use with almost any make of camera can be obtained from any photographic dealer. One for use with a Kodak Brownie costs 3/–, and is provided with a spring mounting by means of which it is held in position in front of the ordinary lens. The attachment does not affect the operation of the camera in any way; its object is simply to reduce the focal length of the regular lens to permit of working closer to the subject.



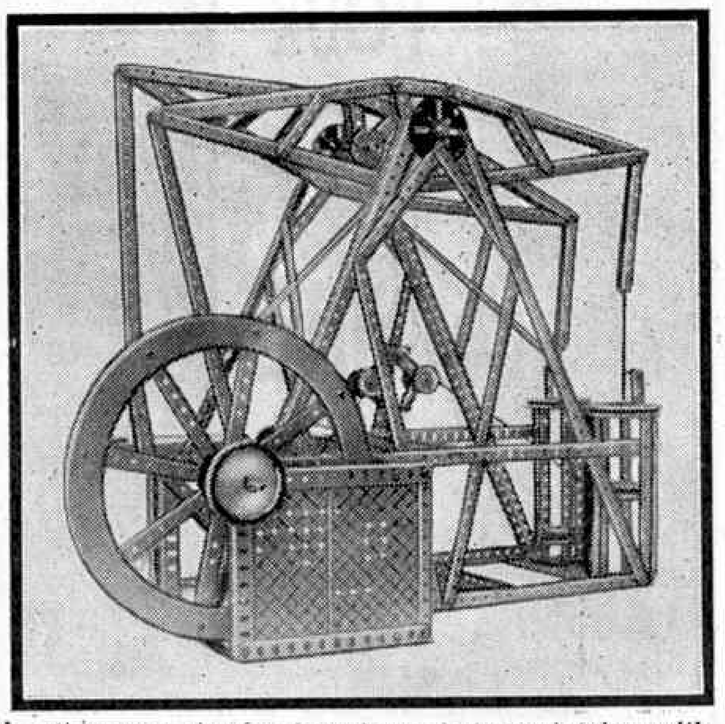
The photograph reproduced above was taken with a box camera fitted with a portrait attachment, and is a good example of the satisfactory work that can be done with the most simple apparatus.

When working with a portrait attachment it is most important to see that the model is the correct distance from the camera. If a Brownie box camera fitted with a No. 1 Kodak portrait attachment is used, the model should be placed at a distance of 3 ft. from the lens. This distance should not be guessed at, but should be measured carefully from the front of the subject to the lens along the centre line of the camera. No part of the model should be nearer than 3 ft. from the lens. Any parts of the model within this distance from the camera will appear blurred in the negative and will ruin the photograph both for competition purposes and for reproduction in the "*M.M.*"

A model being photographed with the aid of a portrait attachment is so near the lens that the view-finder cannot be used as a guide in the ordinary manner. The best plan is to sight the model along the top of the camera, allowing for the fact that this viewpoint is slightly above the lens. A little practice will make the method easy.

The model should, of course, occupy as much space on the film as possible. If the model is a very large one, however, that is, if it exceeds 4 ft. in length or height, it will be found that when the camera is placed only 3 ft. away the image more than fills the view finder. In this case it is best to take separate photographs of each half of the model. These should overlap in the centre so that together they show the entire model. Such photographs will be of greater help to the competition judges than a single photograph that shows only a section of the model.

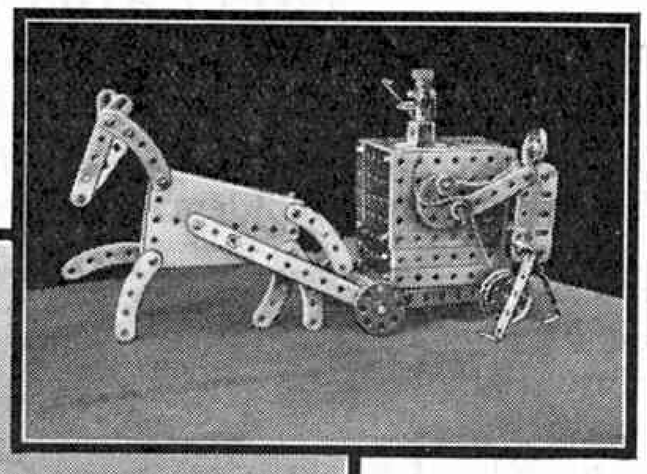
If a suitable situation is available it is best to take the

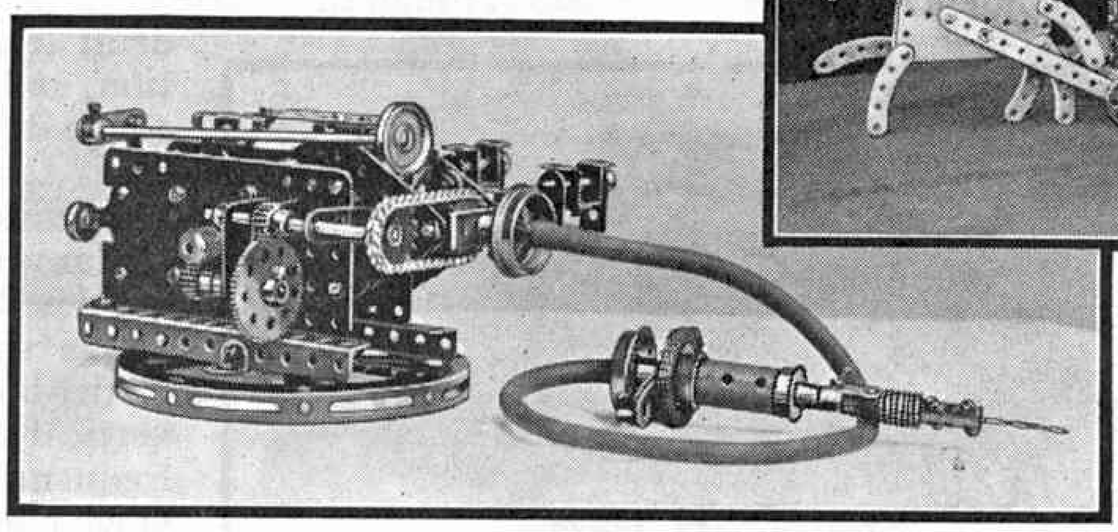


Another example of a clear sharp photograph taken with a box camera fitted with a portrait attachment.

photograph indoors in order to avoid the dense shadows cast by strong outdoor light. A good place is near a large window, the model being so placed that the main light falls on to it from the front.

The next thing is to arrange a suitable background. Often photographs are submitted in which the models, having been taken out-of-doors, appear to be hopelessly entangled in a mass of foliage; others, at first sight, appear to be a view of somebody's house, but close scrutiny brings to light a model extended in delicate tracery against the bricks! An example of this kind of thing is shown in the lower illustration on this page. In this case the photograph was taken out-doors and the situation was deliberately chosen to illustrate the bad effect of an unsuitable background. The iron railings at the rear are so mixed up with the Strips and Girders of the model itself that it is difficult to make out even the general outline of the model, while the finer constructional features are completely lost.





Two photographs of Meccano models that possess all the good points essential for Model-building Contest entries.

The background used for the illustrations on the opposite page was merely a sheet of white rough-surfaced paper, such as cartridge drawing paper. This was hung immediately behind the models, and it will be seen that it throws up the various parts of the models quite distinctly. One or two sheets of similar paper were placed at each side of the models so as to reflect light on to them from all directions.

If a suitable situation indoors is not available, good photographs can be taken out-doors provided that care is taken to avoid strong sunlight, and to arrange a satisfactory background.

The angle at which the model is photographed is of great importance if the best results are to be obtained. It is advisable therefore to study the model carefully from all sides until the viewpoint that shows most clearly the essential details is found. Usually a three-quarter front view, taken at eye level, is the most satisfactory.

When a suitable background has been arranged and the model has been set up, the next thing is to place the camera in position. It is important that the instrument should be firmly supported, as a time exposure will be required. It should therefore be placed on a table that is firm on its legs, so that it will not wobble through vibration caused by passing traffic or by the photographer's footsteps, or on some equally secure support. It should be at such a height that its lens is approximately in line with the centre of the model, and when the correct position has been found one hand should be placed on the camera to make sure that it is kept absolutely still while the shutter is being operated.

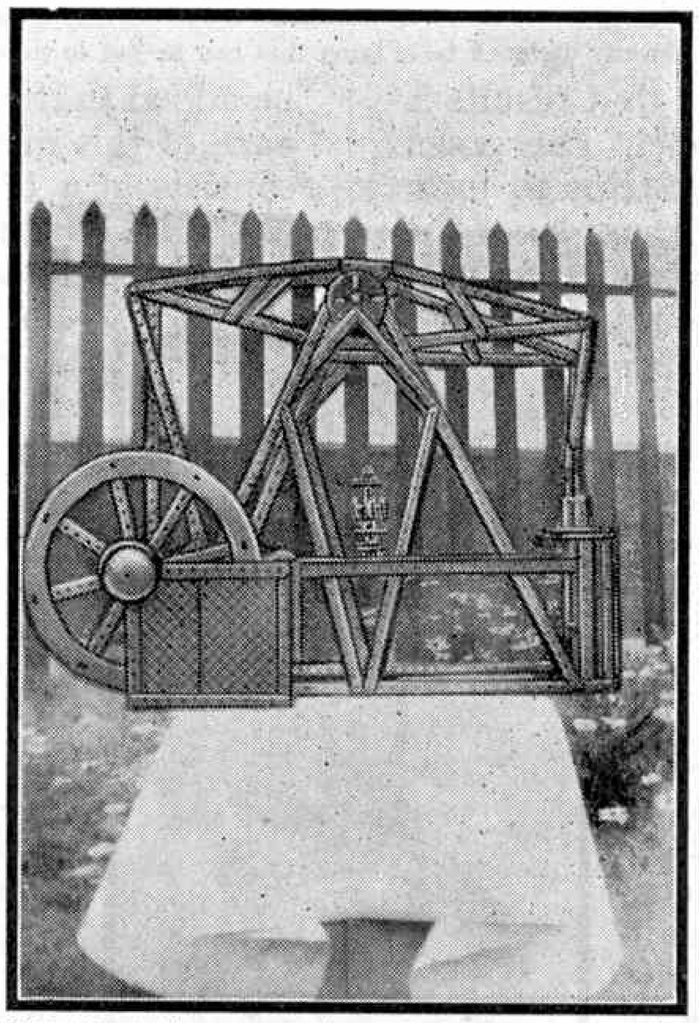
In order to obtain the greatest possible degree of sharpness and to show the smallest details in the photograph, it is necessary to use the smallest aperture or "stop" with which the camera is provided. This is usually F/16, and owing to the small amount of light this stop can pass, a long exposure has to be given. It is not possible to give definite instructions as to the exposure required, as this depends entirely on the particular lighting conditions and the kind of film being used. The best plan is to make use of an exposure meter of some kind. A simple form of this instrument only need be used, and the well-known meter made by Burroughs Wellcome is quite suitable. Guidance in regard to indoor exposures is given in many of the handbooks and leaflets issued by camera makers, and these will give useful help.

When it is not possible to photograph the model by daylight, artificial lighting can be employed. For this purpose ordinary electric lamps are the most suitable. If only a single overhead lamp is available, the model should be placed in such a position that the light falls on it from the front at an angle of about 45 degrees. If a second lamp, such as a portable table lamp, also is available, it should be used in conjunction with the overhead light and should be placed a little to one side of the model. In order to avoid heavy shadows it is better to use a pearl or opal globe than a clear one, and to arrange one or two sheets of white paper at each side of the model so as to reflect light on to it from different directions.

If gaslight only is available, this may be used quite satisfactorily, but a very long exposure will be required. No matter which source of illumination is used, however, the correct exposure time should be ascertained by a calculator.

Where neither electric light nor gas is available, the best alternative is magnesium ribbon. This is easy to use, and may be purchased in small quantities in special holders provided with an arrangement for feeding out the length of ribbon required. Heavy shadows can be avoided if the burning ribbon is moved slowly from side to side while the exposure is made, care being taken to hold it slightly behind the camera so that the light from it does not fall directly on to the lens. A tin or an old plate should be held under the burning ribbon to avoid trouble if a blazing piece should break off and fall.

It is quite as important to obtain a good print as it is to obtain a sharp negative. The most suitable prints are those on glossy paper, as these not only show the finer details more clearly than a print on matt or rough paper, but also reproduce better.



This illustration shows the effect of photographing a model against an unsuitable background.

In Search of New Models

Meccano in the Home

THE brilliant colouring of Meccano parts lends itself well to decorative effects, and model-builders will have no difficulty in finding opportunities for exercising their skill in making simple models that are both useful and picturesque in appearance. This month we are dealing with several models that will suggest what can be done in this direction.

The Reading Lamp shown in Fig. 1 is an excellent example of a useful type of Meccano model and will look well on a bureau or on the table of a study, where it will retain its lustre for many years. The globe that forms its base is constructed of 1½" Strips. Five of these are first bolted together to form a pentagon, and from each corner of this radiate five others. It is a good plan to use gold coloured parts for the pentagon, and green enamelled parts for the radiating Strips and the "figures" of which they form part. The pleasing contrast in colour that results is suggested in the photograph of the model. The green radiating Strips are extended by further Strips to form five six-sided figures, each based on one of the sides of the original pentagon, and these are further extended to form a set of five and six sided figures. Throughout this construction the 1½" Strips must be curved slightly as necessary.

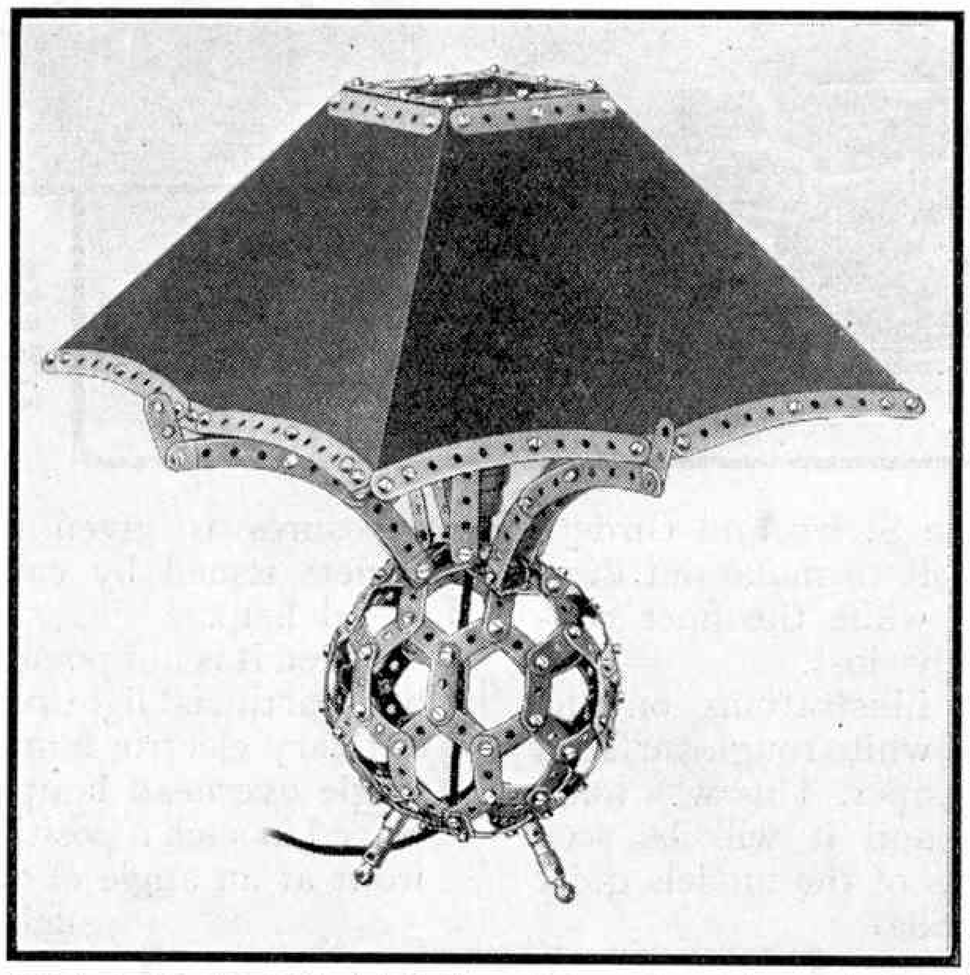


Fig. 1. A cleverly designed table lamp that can be put to practical use.

This completes one half of the globe, and it is then duplicated, and the two halves are joined together by green 1½" Strips, as shown. The colour scheme of this part of the model is of course optional, and if desired, gold or green parts can be used throughout.

Each of the three legs is built up as shown from a Rod Socket, Handrail Coupling and the shank of a Buffer. The arms supporting the shade are built of 4" Curved Strips fitted to the globe by means of Double Brackets. The shade of course can be made to suit individual requirements. Any good semi-transparent paper, carried in a framework of straight and curved Strips, can be used, and a shade of better quality can be made from coloured celluloid, which is obtainable in sheets of varying size from most stationers. Good effects can be obtained by drawing or painting simple designs on the panels of the shade.

The electric lamp can be carried in either a "batten" type lampholder, or in a combined switch and lampholder of the "pendant" type. Whatever type is used, a simple framework of Strips will be required to secure it to the globe. The flex connecting the lamp to the mains supply passes through the centre of the globe. This should be new, or at least in very good condition, and it is best to use rubber covered wiring in order to be sure that there will be no accidental short circuits.

Many variations of this lamp are possible and its design offers ample scope for the ingenious model-builder. Lamps with vertical stands, such as are seen frequently on dining tables, and bowl lamps hanging from wall brackets can readily be built by the use of only a few parts. The Meccano wall bracket shown in Fig. 4 can be adapted to this purpose.

A different type of model is shown in Fig. 3. This is a simple but efficient barometer that can be built in a variety of different designs. The model can be fitted into any odd corner of a hall and, if desired, a graduated scale can be added that will simplify readings. The general appearance of this model is that of a flower, the stem of which consists of a 12 in. length of Glass Tubing, Kemex Part No. K15, that forms the barometer tube. The bottom of the tube is connected by a short length of rubber piping to an "L" shaped glass tube, for which Kemex Part No. K12 is suitable, that is passed through a cork into the neck of an inverted bottle. This can be one in which minerals are supplied, and the cork must fit tightly. The bottle is partly filled with water coloured with red ink. This liquid flows into the tube forming the stem of the flower, and the level in the tube is raised slightly above that in the bottle by blowing down the tube until a small air bubble passes into the bottle.

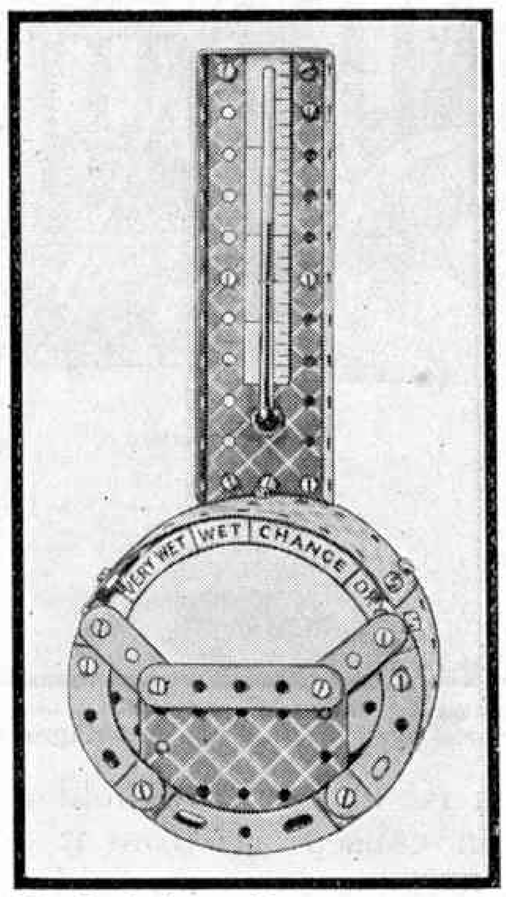


Fig. 2. A form of barometer that is easy to build and simple in operation.

When wet weather is impending, and the pressure of the atmosphere becomes less, the column of water in the glass tube of the barometer rises proportionately. A period of dry, warm weather causes a fall in the level in the tube, owing to the increased atmospheric pressure. The best results are obtained when the bottle is about a quarter full of liquid. The colour of the latter is not important, but if green or gold parts are used in the construction, a red liquid gives a good colour effect and is more easily seen than clear water.

This barometer should be kept in a room in which the temperature does not vary greatly, for if it is exposed to the varying heat from the sun or a fire the air in the bottle expands and confuses the readings by forcing up the

level in the tube. Even grasping the bottle with the hand will cause the liquid to rise in the tube, but this does not mean that there is a probability of rain!

A different type of barometer is shown in Fig. 2. In appearance this is of the form usually seen and it works on a simple but very interesting principle. The framework consists essentially of a 4″ Circular Plate carrying round its circumference two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. These are secured in position by means of $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets and $\frac{3}{8}''$ Bolts. The upper part of the frame does not effect the working of the barometer, but forms a housing for a small thermometer.

The moving part of the barometer is a disc of light, non-warping card of $3\frac{3}{4}''$ diameter, through the centre of which is passed a needle or pin sharpened at both ends. The card is suspended vertically in the barometer case, the ends of this needle being carried in pointed bearings in the centres of Elektron Magnet Yokes, Part No. 1555. Two of these Yokes of course are required, and they are held in place inside the model by 6BA Bolts and Nuts. On the right hand side of the disc, and behind it, is fixed a shallow cardboard box, not more than $\frac{3}{4}''$ in length, filled with rock salt. The box must be open at the side facing the rear of the model, and after it is filled with rock salt the opening is covered with some finely woven material so that the salt is in contact with the atmosphere.

The disc is balanced by adding small weights at a point directly opposite the box containing the rock salt. This balancing must be done in a warm, dry room after the disc has been dried in an oven for a few minutes, and the counterbalancing weights must be heavy enough to bring the box of salt to the highest possible position. When the barometer is in use, the box remains in this position during dry weather, but falls below it in wet weather because the salt absorbs moisture from the air and increases its weight, the disc then rotating in a clockwise direction when seen from the front. When dry weather returns, the moisture in the salt evaporates and the disc returns to its original position. The card of course is marked with the usual weather indications, as shown in Fig. 2, and the words at the top tell the user what he may expect in regard to weather conditions.

Another form of useful ornament that can be built with Meccano parts is shown in Fig. 4. This is a flower or fern basket, and looks very attractive when hung in an elevated position out of doors with a suitable plant or fern in it. Many different designs are possible, and that shown in Fig. 4 can easily be modified to suit individual requirements.

The wall bracket consists of two $12\frac{1}{2}''$ Strips and two $7\frac{1}{2}''$ Strips joined together at right angles by means of four 4″ Curved Strips. The outer ends of the $7\frac{1}{2}''$ Strips and the bottom ends of the $12\frac{1}{2}''$ Strips are fitted with additional $2\frac{1}{2}''$ large radius Curved Strips. These represent the bent iron work typical of fittings of this type. A subsidiary curved bracing bracket is bolted to the top of the main bracket, and this is formed from 4″ Curved Strips and $2\frac{1}{2}''$ Curved Strips, large and small radius.

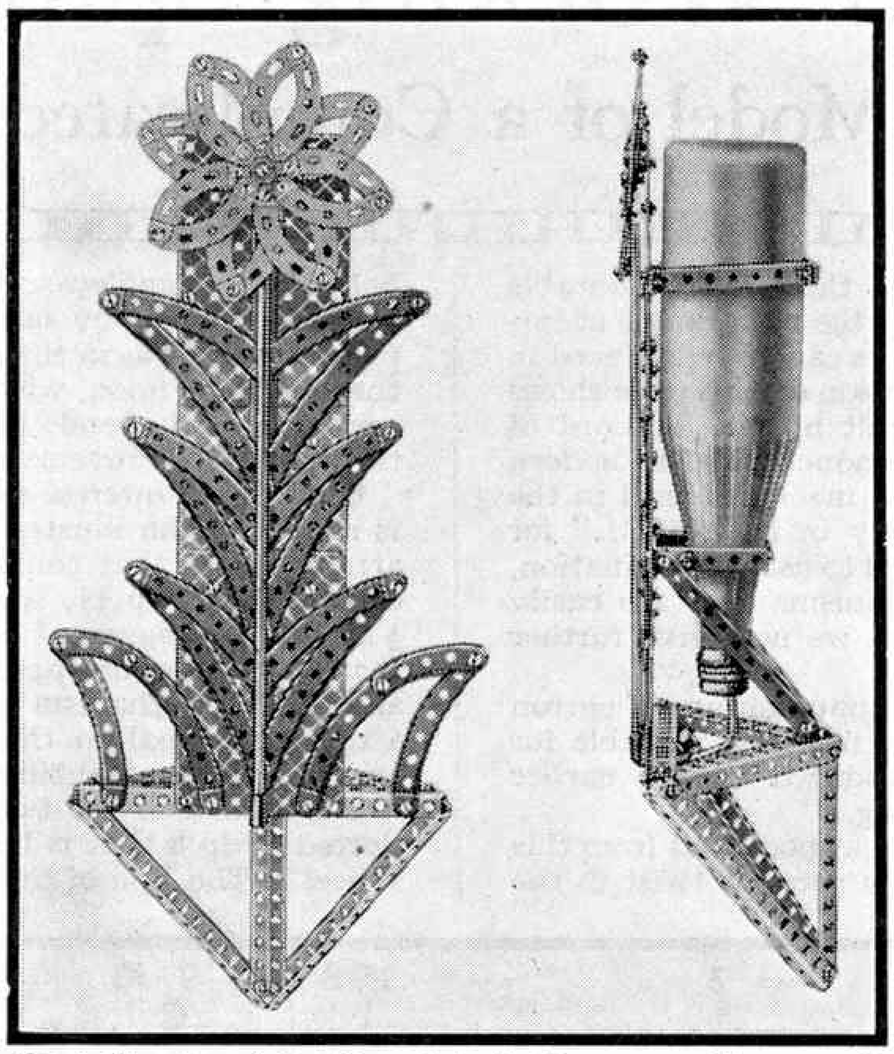


Fig. 3. The stem of the "flower" in the Meccano model seen on the left of this illustration is the tube of a novel barometer, the working parts of which are shown on the right.

The hanging basket is built up in a similar manner to one half of the globe built into the model shown in Fig. 1. The arrangement of $1\frac{1}{2}''$ Strips is altered slightly, however, so that the edge of the flower basket has a serrated appearance. The basket is suspended by three lengths of Meccano Sprocket Chain, the lower ends of which are fixed to the $1\frac{1}{2}''$ Strips by Flat Brackets. The upper ends of the chains are carried on a Small Loaded Hook.

An excellent small hanging lamp can be formed by inverting the basket and covering it inside with different coloured sections of celluloid or paper. A small lamp mounted inside the inverted basket by means of a batten type lamp holder will give an artistic coloured effect if the sections of the material are carefully arranged.

The possibilities of building new models along the lines set out in this article are numerous and many new ideas are to be found in such well-known household articles as pipe racks, tie racks, candle sticks, etc. Novelty pipe racks can be made in the form of nigger minstrels, piccaninnies, clowns and a host of other characters, and two pipes, placed in concealed racks, can be arranged to look like legs. Coloured parts are used to advantage in these models especially when making the faces.

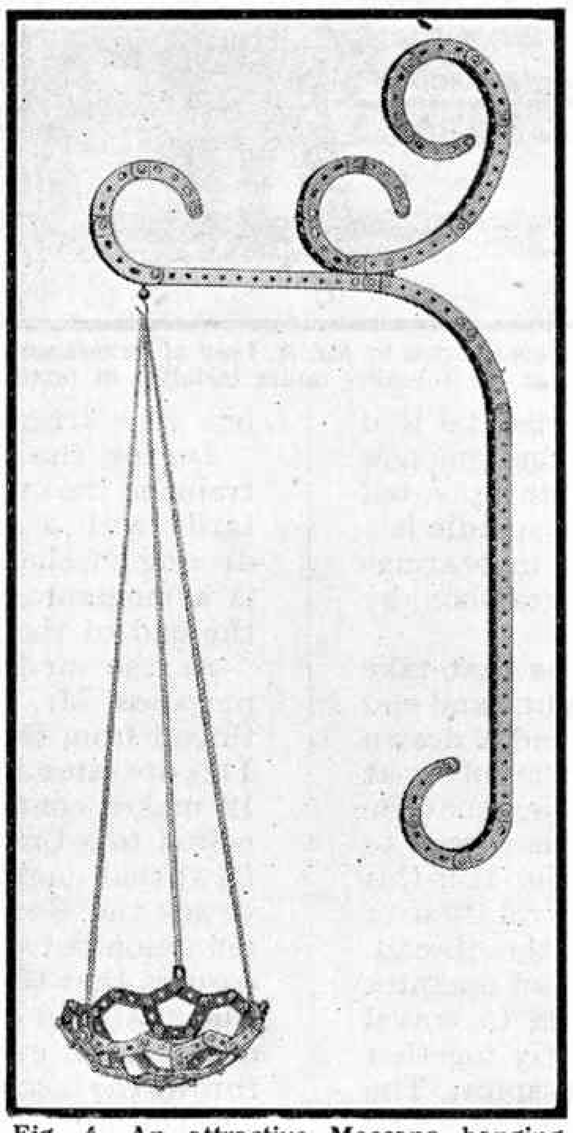


Fig. 4. An attractive Meccano hanging basket suitable for ferns and other plants.

A minstrel's face, for example, may consist of a blue enamelled Face Plate, on which are bolted a large radius and small radius Curved Strip, in gold, to suggest a mouth. The "nose" a 1″ Triangular Plate, and "eyes" two 1″ loose Pulleys, complete the appearance. The addition of a large "top hat" of Strips, and small "body" represented by a Flat Trunnion, will bring to life a caricature of very humorous appearance.

The Meccano figures are shown to best advantage when arranged before a background of Blue and Gold Flat Plates, the lower portion of which is constructed to form the pipe rack. A piccaninny, built along similar lines but supplied with a skirt of $2\frac{1}{2}''$ Curved Strips, is suitable for enlivening any dark corner of a room.

A tie rack, on which any small article can be hung before the fire to dry, can be built with only a few parts, to represent a two-door stable. The front of the stable only need be represented and from each door the head of a Meccano horse "looks out." Halters from the heads of the horses to the centre of the stable wall form the lines for carrying the articles to be dried.

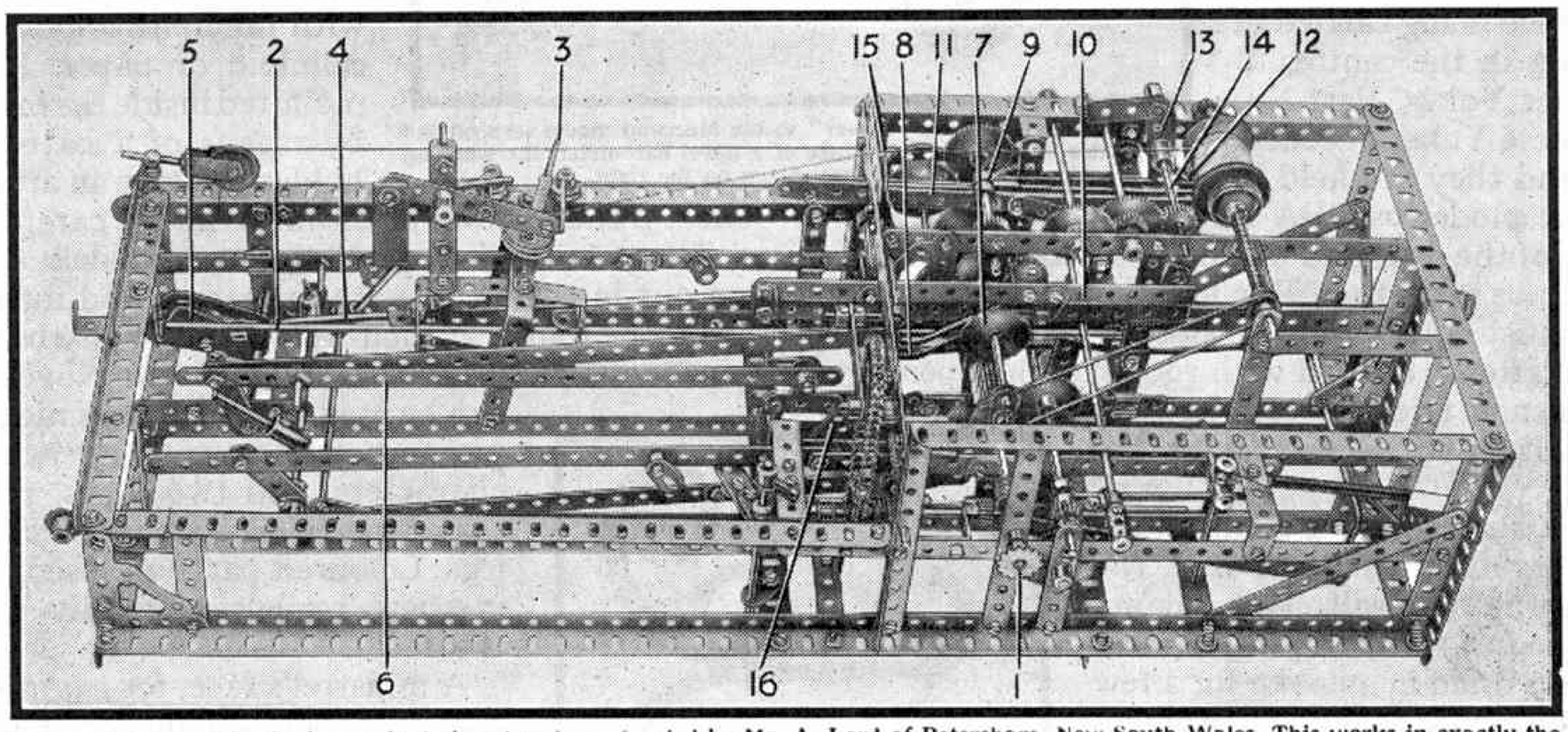
A Meccano Working Spinning Mule

Accurate Model of a Complicated Machine

FROM time to time we have described in the "*M.M.*" notable models built by readers that demonstrate the remarkable accuracy with which great engineering masterpieces can be reproduced in model form with Meccano parts. The illustration on this page shows another model of this kind, which was built by Mr. A. Lord of Petersham, New South Wales. It is a reproduction of a modern spinning mule, one of the most complicated machines used in the textile industry, and was referred to briefly in the "*M.M.*" for March 1935. Recently Mr. Lord sent the model to us for examination, and as it contains several ingenious mechanisms that are easily adaptable for use in other kinds of models, we now give further details of it.

The purpose of the spinning mule in the manufacture of cotton or woollen thread is to spin smooth strong material, suitable for weaving, from the rough weak thread produced by the earlier processes of carding, drawing and slubbing.

The thread is placed in the mule wound on a spool, and from this it is led to a revolving spindle that applies a peculiar twist to the fibres and winds up the finished material in the form of a conical-shaped bobbin, known as a cop. Mr. Lord's model carries out all these operations in exactly the same manner as an actual mule. The cop is formed on a spindle 3, which is mounted on a travelling carriage that consists of a Strip bent to form a $3\frac{1}{2}'' \times 1\frac{1}{2}''$ double angle strip. The carriage slides on a horizontal Rod 2, and a second Rod 4, which at one end has a Collar that engages the slot of a special cam 5, causes a wire finger attached to a pivoted $3\frac{1}{2}''$ Strip to move up and down the cop spindle 3. The spindle is a Rod filed to a point at its upper end, and it revolves in bearings in the carriage. The drive is taken from the main gear-box by means of cord.



A remarkable model spinning mule designed and constructed by Mr. A. Lord of Petersham, New South Wales. This works in exactly the same manner as the spinning mules installed in textile factories.

The following is a brief description of the operations that take place. The cop carriage commences operations at the right-hand end of its slide. It first of all travels slowly to the left. Thread is drawn from the spool, and at the same time the cop spindle revolves at high speed. When the spindle first begins to rotate, the fact that the cop is tapered and inclined from the vertical, causes the thread to travel upward and finally to slip off the end of the spindle. It is this slipping-off movement in conjunction with the rapid rotation of the cop spindle that applies the necessary twist to the thread.

At the end of its travel the carriage strikes a stop and operates mechanism that causes the finger on the pivoted arm to travel rapidly down the cop, drawing all the upper turns tightly together and placing a binding thread down the cop in a steep spiral. The carriage then travels slowly back to its original position and winds the thread on to the cop, and simultaneously the Rod 4 allows the wire finger to rise slowly. At the end of the travel cam 5 rises quickly and lifts Rod 4 and the wire finger, so that the latter is well clear of the cop and ready for the next draw.

The carriage is operated by an ingenious return mechanism. A Strip attached to the carriage slides in an Eye Piece, and has a short length of Rack Strip bolted to it. At each end of the travel of the carriage the Rack Strip is just out of mesh with a Pinion that is driven continually, but in opposite directions during each half of the complete cycle of operations. The carriage is pushed forward slightly by means of a system of Strips provided with projecting pins as in the case of Strip 6, until its Rack Strip engages the rotating Pinion, which carries it along until it is thrown out of gear at the other end. Another pin then throws it into mesh again, to travel in the reverse direction.

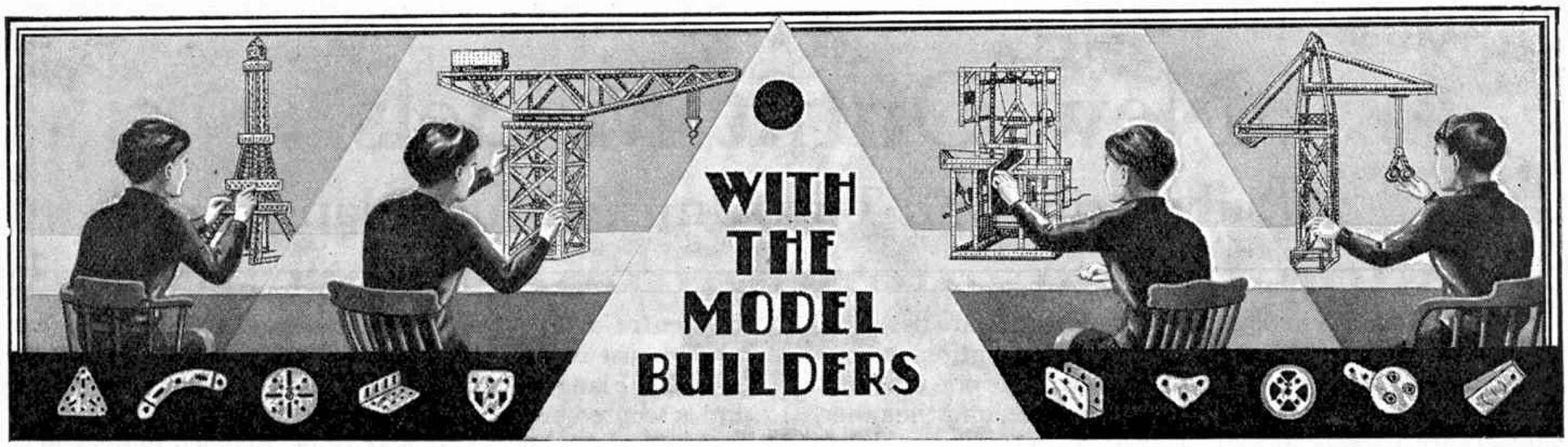
One of two interesting reverse gears incorporated in the model is shown in the illustration at 9. It is used for altering the gear arrangements that control the cop spindle and the cam 5. A reciprocating Strip 11, bent so that its ends are parallel but about $\frac{1}{8}$ in. out of alignment engages between two Collars 9 on a Rod that slides sideways across the machine. It is actuated by a Rack and Pinion mechanism and as it travels, the sliding Rod is moved a distance equal to the misalignment in the ends of the Strip, and its movement is utilised to throw certain gear trains into reverse.

The second of the two reversing gears is actuated by a special slotted Strip 8 that is bent roughly at 60° to the axis of the Gear Wheel 7. The Rod of this gear passes through the slot in the Strip, and a Collar on the side of the Strip opposite from the gear prevents the Rod from sliding freely. The Strip is bolted to the assembly 6, to which the travelling carriage imparts a reciprocating motion. As the Strip moves from right to left, or vice-versa, the gear and its Rod slide through a distance of about $\frac{3}{4}$ in., and the various gear arrangements are altered.

During the operation of changing from one of the main gear trains to the other, a gear wheel on the sliding Rod engages momentarily with a special narrow-faced pinion that forms part of the driving mechanism of the cop spindle. The result of this action is a momentary increase in the speed of rotation of the cop at the end of the draw.

As the model was required to work continuously for display purposes, Mr. Lord devised an ingenious gear for re-winding the thread from the cop on to the spool at the end of every 80 draws. This operates as follows. At the end of each draw the Angle Bracket 12 makes contact with the lower end of the $2\frac{1}{2}''$ Strip 13 that is bolted to a Crank on Rod 14. The assembly 13 is provided with a Pawl that engages a Ratchet Wheel, and each time the Strip 13 is struck the Rod 14 is rotated 1/20th of a revolution. A 4 : 1 gear reduction between this and a Rod that operates the rewinding gear ensures that 80 draws are completed before rewinding takes place. The final Rod of the 4 : 1 gear train has a pointed striking cam secured to its end, and as it rotates this forces down a lever that throws the mechanisms that control the carriage and cop out of gear. The cop spindle now being free to revolve the thread is rewound on to the spool and the distributing arm 15 guides the thread backward and forward and fills the bobbin evenly. The rewinding of the thread on to the spool is automatic, as during the whole of the normal spinning period the spool is rotated against the action of the spring clip clutch. When the cop is thrown out of gear the clutch friction is strong enough to turn the spool.

While these operations are being performed, the pointed cam 16 is rotating slowly, and when all the thread has been wound on to the spool, the cam returns the various gears to their original positions.



CUCKOO CLOCK MECHANISM

Meccano clock making still holds the interest of model-builders, and the latest development in this direction is a cuckoo clock built by H. Lloyd, Toronto. In general appearance Lloyd's clock is similar to the Wall Clock described in last month's issue of the "*M.M.*," but the top portion of the frame is modified slightly in order to allow a small double door to be fitted. Each side of this door is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate suspended on a vertical length of elastic to form a hinge. The elastic is clamped to the door by two Flat Brackets, and at each end is fitted to the frame of the clock by Collars.

The chief novelty of Lloyd's clock, of course, is the cuckoo mechanism itself, in which Meccano bellows supply air to two note tubes adjusted to give the required notes. The cuckoo is one taken from an ordinary cuckoo clock, but no doubt many ingenious Meccano enthusiasts will be able to design a Meccano "bird" that will be quite efficient.

The note tubes are ingeniously built up of Kemex and Meccano parts. Each consists of a Kemex Test Tube, Part No. K2, partially filled with water, and it is easy to adjust the cuckoo notes by varying the amount of water in them. The pitch of the note is raised by adding water, and lowered by the reverse operation.

The test tubes are suspended from their upper ends by means of clamps built from $2\frac{1}{2}''$ Strips, and in building the model care must be taken to see that these clamps are not too tight, so that there is no possibility of the glass being fractured. The quality of the notes can be improved by placing strips of thick felt between the clamps and the test tubes. The two pipes down which passes the air for blowing the notes are made by rolling lengths of paper round a pencil and gumming the edges to prevent unrolling. The ends of the pipes adjacent the top of the test tubes must be flattened to give two long narrow openings. The lower edge of each opening rests on the edge of the test tube, and a musical note is produced when the pipe is lightly blown. A little adjustment will be necessary before a perfect note results.

Each of the two sets of bellows operating the "cuckoo" is formed from two Boiler Ends joined together by a tube of flexible material. This tube may be formed from a small sheet of very thin rubber, such as that from which toy balloons are manufactured. The lower Boiler End is secured rigidly to the frame of the clock and the upper Boiler End is carried on the lower end of the operating lever, which is moved by a quick action cam.

GRANDFATHER CLOCK

A fine Meccano Grandfather Clock, built by F. Botting, Glen Osmond, Australia, was so attractive that it was described and illustrated in the local press, in addition to being displayed in a large store in Adelaide, where it gave rise to favourable comment.

The illustration on this page shows F. Botting with his model. It will be seen to be similar in design to the standard Meccano model described in Super Model Instruction Leaflet No. 14a, but the framework has been modified slightly and the driving weight is enclosed in a large box.

A SIMPLE SCREW MOVEMENT

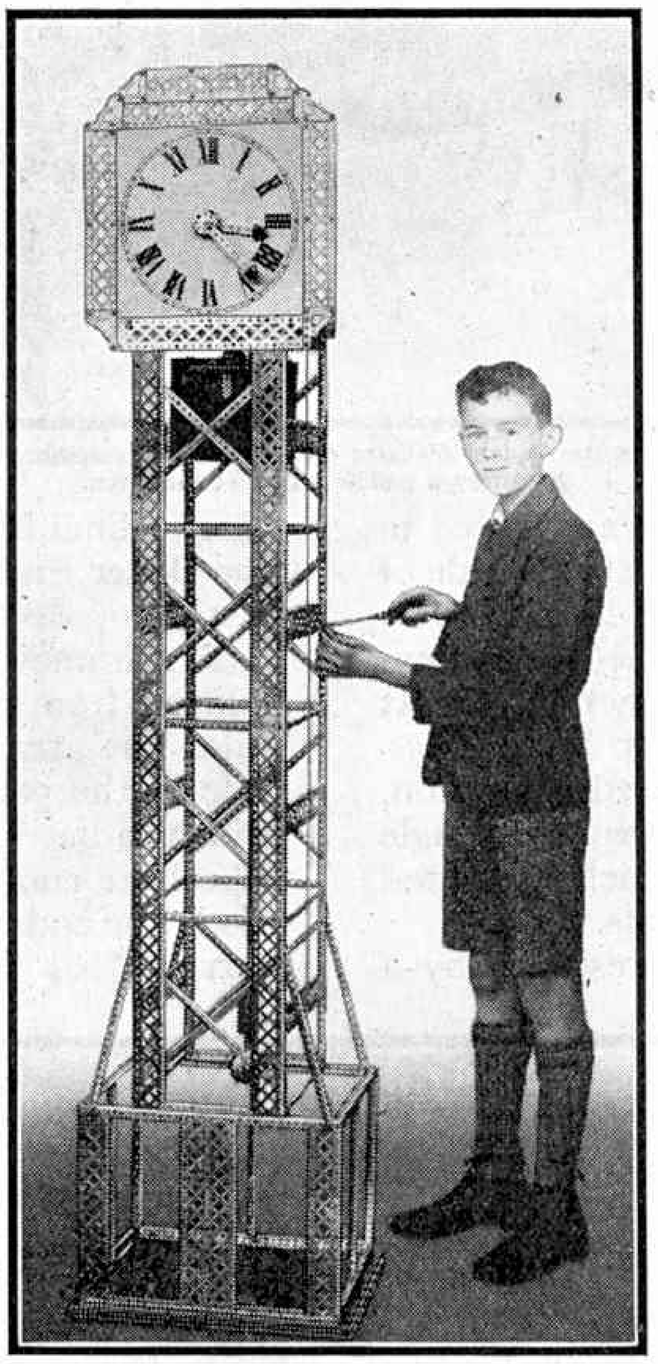
The usual method of obtaining a screw traverse with Meccano parts is by passing a Threaded Rod down the centre of a Nut or Threaded Boss, when the two threaded parts can be moved in either direction by rotating the Rod. Both schemes are simple, but when building a large model the necessary parts cannot always be spared and some other expedient is desirable.

B. Everest, Walsall, suggests a simple screw movement that will doubtless be useful to many model-builders. A length of copper or steel wire is bound tightly round a Threaded Rod over a length of about $\frac{1}{4}''$. The resulting wire "nut" is similar in appearance to an Anchoring Spring, Part No. 176, and acts like a Threaded Boss. One end of the wire forming the coil is next turned into a loop and through this passes a bolt, attached to a short Strip by a nut. A Washer is placed between the head of the bolt and the wire loop.

This screw movement is suitable for small, light mechanisms, and when oiled thoroughly will work very smoothly on its Threaded Rod.

MECCANO SHOOTING RANGE

From Canada comes a suggestion for miniature shooting ranges that will interest Meccano enthusiasts who possess small calibre sporting rifles or air guns. H. Roland, Montreal, who has submitted the suggestion, has graduated through air guns and small shot guns to full bore sporting rifles, and has made use of his Meccano parts to build an automatic clay-pigeon thrower and a "flying-bird" shooting range in order to improve his marksmanship.



This fine Grandfather Clock, built by F. Botting, Glen Osmond, Australia, has created considerable interest among the many people who have examined it.

The clay pigeon thrower is a small but very powerful catapult that flings into the air a disc of hard-baked clay about the size of a small dinner plate. The base consists of four H girders, each built from four $24\frac{1}{2}''$ Angle Girders, connected together at six points by means of $7\frac{1}{2}''$ Angle Girders. On this solid base is pivoted the catapult, built from a number of $12\frac{1}{2}''$ Angle Girders, and this is controlled by a battery of powerful coil springs. It is drawn into its "firing" position by an Electric Motor, geared down to give the required power. A clay-pigeon then rolls on to it, releasing an automatic catch, and is flung high into the air to form a target for the marksman. Resetting and firing is carried out automatically by the Motor at intervals of about three minutes.

The model shooting range built by H. Roland also is operated by an Electric Motor. It takes the form of an endless belt of Sprocket Chain passing round two 3" Sprocket Wheels. The Rods carrying the Sprocket Wheels slope backward at an angle of about 10 deg. Lengths of Cord are secured to the Chain at intervals and from these hang small cardboard "birds." When the Cords and birds are moving along with the upper length of Sprocket Chain they are hidden behind a sheet of heavy metal, and only come into view when travelling with the lower section of the Chain. The Chain is driven slowly by the Electric Motor through suitable gearing, and the birds suspended from it form lifelike, moving targets.

A BUILT-UP CRANKSHAFT

The construction of large and small Crankshafts for Meccano model engines cannot always be carried out by using Couplings or Cranks. An alternative is suggested by W. Crowther, Birmingham, who makes use of Strips, Flat Brackets and Rod Sockets. These Rod Sockets are accommodated in the end holes of the Strips or Flat Brackets and protrude on opposite sides. Two or more Strips can be used for crankshafts with a more massive appearance, or Triangular Plates and Flat Trunnions can be employed. Short Rods are used to join the various sections of the crankshaft together.

A UNIQUE MECCANO PIANO

Something really new in Meccano model-building comes from S. Thompson, Rugby, an enthusiastic model designer who has made use of Meccano parts in a unique "piano," each note of which is produced by striking a jam jar or wine glass in which water is placed. The jars or glasses are the only non-Meccano sections of the model. The key-board covers three octaves and includes sharps and flats. It is built up from $12\frac{1}{2}''$ and $24\frac{1}{2}''$ Angle Girders. Each "white" key is represented by a $5\frac{1}{2}''$ Strip pivotally mounted three holes from its inner end on a Double Bracket, and is held in its normal position by a short length of Spring Cord. Two Silver-tipped Contact Screws are brought together when it is depressed, and this completes an electrical circuit and excites the coil of a magnetic hammer. The hammer mechanism is built very simply and consists of an Elektron Magnet Coil, Part No. 1538, and a Magnet Core, Part No. 1539. The Core slides freely in the centre bore of the Magnet Coil and to its threaded end is fastened the hammer, which is held away from the glass jar by a very light spring. When the hammer is raised and allowed to fall quickly, the weight of the mechanism overcomes the spring and strikes the jar. The spring then lifts the hammer clear of the jar until the note is again struck.

Shorter Strips are used to represent the black keys, and these are arranged in a similar manner to the white keys, above which they are raised slightly.

The casing of the model has an extremely pleasing appearance and is built up from a number of Strip Plates and Curved Strips of various sizes. Two "stops" are provided for increasing or decreasing the power of the notes. These act in the same manner as the swell stop of a real organ and control the amount of current passing to the Magnet Coils.

This model seems to open up a new field for ingenuity in model-building. No doubt this will be explored by many Meccano enthusiasts full of ideas for new effects worked out on similar lines.

IMPROVED CLOCKWORK MOTORS. (Reply to J. Fallowfield, Sompting, Sussex.) The size and shape of the present Meccano Clockwork Motors does not permit them to be built into certain small Meccano models without considerable trouble, and for this reason J. Fallowfield has suggested the introduction of motors similar to those fitted in No. 2 Special Hornby Locomotives, but with slightly modified side plates.

The idea has much to recommend it, but it is doubtful if the demand for motors of this size would justify their introduction. With a little ingenuity the existing range can be made to fulfil practically all requirements. For instance, the Magic Motor is suitable for driving small models, and two of these Motors can be joined in tandem, that is with their driving shafts linked-up by a Coupling or connecting gear train, if greater power is required and space is limited. A small Meccano Motor Chassis is a suitable model for driving in this manner.

SMALL HUB DISCS. (Reply to M. Fellows, Lancaster.) The introduction of Hub Discs, $3\frac{1}{2}''$ in diameter, has been under consideration for some time but up to the present nothing definite has evolved. These parts would be used primarily in conjunction with 4" Circular Plates to form intermediate size flanged wheels.

New Outfit Models

A Submarine and Two Unusual Aeroplanes

THE four models to be described this month are based on vessels and aeroplanes that with one exception are unusual in type and not very widely known. The one that will be familiar to model-builders is a submarine, and the other subjects are a Mississippi steam-boat, an aeroplane without a tail and an interesting American aeroplane in which the fuselage and tail unit are of special design.

The first of these models to be dealt with is the Mississippi steam-boat, a splendid miniature reproduction of a stern-wheeler built with Outfit G. Its construction is commenced by connecting two Flanged Plates 1 and 1a by means of the compound strips 2, each of which carries a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 3. Three Double Brackets are bolted to the inside of each strip 2, and these support the outside of the lower deck and also the $12\frac{1}{2}''$ Strip Plate 4. To the forward end of the Strip Plates are bolted two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, and these are curved in the manner shown. At the rear of the lower deck two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates, connected by a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, are secured in position. Together with the Plates 4, these carry two $12\frac{1}{2}''$ Angle Girders 5, to the unoccupied flanges of which are fitted the $12\frac{1}{2}''$ Strips 6 by means of Flat Brackets.

The after end of the middle deck is represented by a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, and this carries along its upper edge a $5\frac{1}{2}''$ Angle Girder. This in turn has bolted to it the double $12\frac{1}{2}''$ Angle Girders forming the sides of top deck. The free ends of these Girders are fitted with Angle Brackets that are attached to vertical $5\frac{1}{2}''$ Strips 7. These also form derrick-stumps.

The forward ends of the middle and upper decks are rounded by the addition of four $2\frac{1}{2}''$ large radius Curved Strips, which are bolted in pairs to Angle Brackets that in turn are bolted to the Strips 7, and a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 8 is fitted as shown. The gang-plank consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate that is bolted at its lower end to two $\frac{1}{2}''$ Reversed Angle Brackets in the manner shown in Fig. 1. The lower holes of these Reversed Angle Brackets accommodate a short Rod forming a pivot.

The upper deck of the model is built from three $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates 10 and two $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates 11. Down the centre of the deck passes a compound strip 12. The wheel house is carried on this deck. It is built up from two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates and two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates and is secured in place by means of a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket. Its forward end consists of a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate held in position by a Reversed Angle Bracket 13. The inner portion of this Bracket has bolted to it a $1'' \times 1''$ Angle Bracket, and to this the "wheel," represented by a Face Plate, is attached by means of a $\frac{3}{8}''$ Bolt.

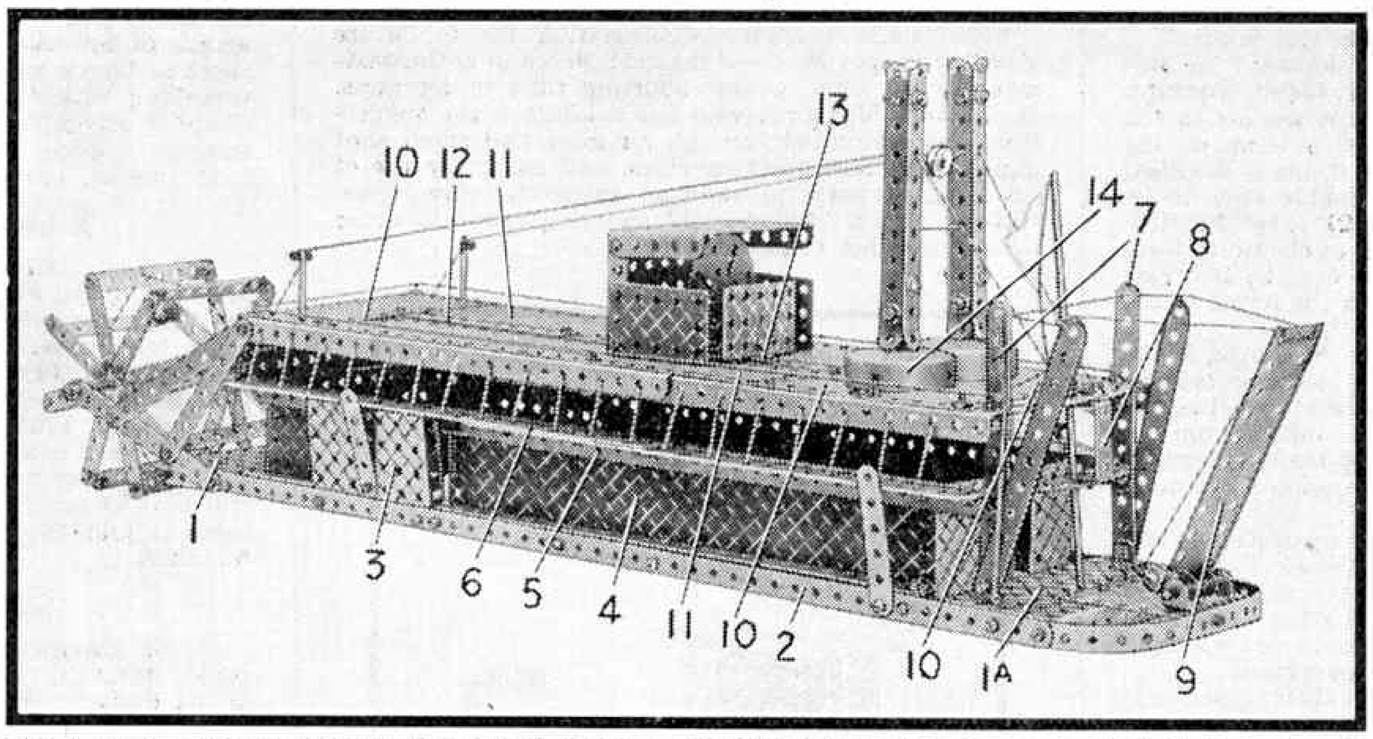


Fig. 1. This model reproduces the typical features of a Mississippi steamer, a vessel of shallow draught driven by a paddle wheel at the stern.

Four $5\frac{1}{2}''$ Strips, turned over at their ends, are used for each funnel. These Strips are fixed to Couplings at their upper and lower ends, the lower Coupling accommodating a 3" Rod in its longitudinal bore. The 3" Rod passes through the centre of the Boiler End 14, and is held in position on the underside of the top deck by means of a $\frac{3}{4}''$ Flanged Wheel.

The framework for carrying the stern paddle-wheel is built up from six $5\frac{1}{2}''$ Strips, three of which are used on each side. The arrangement is shown in the illustration. Each side of the paddle-wheel consists of a Bush Wheel, from which radiate eight $2\frac{1}{2}''$ Strips, and when both sides of the wheel are complete they are mounted $3\frac{1}{2}''$ apart on a $6\frac{1}{2}''$ Rod. The ends of each alternate pair of radiating $2\frac{1}{2}''$ Strips carry $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, and the remaining pairs of $2\frac{1}{2}''$ Strips have $3\frac{1}{2}''$ Strips fitted to them by means of Angle Brackets.

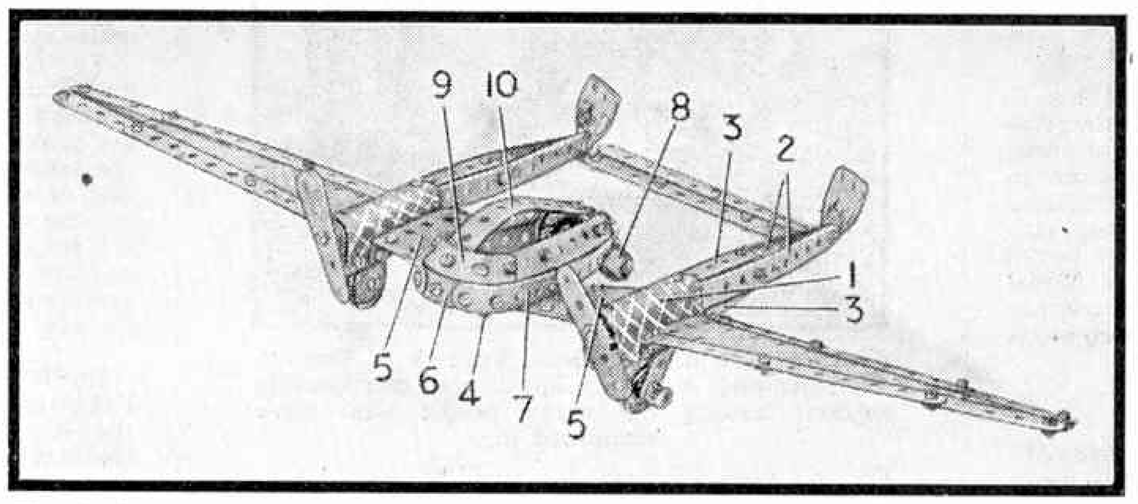


Fig. 2. An unusual type of aeroplane, in which the tail unit is carried on two booms instead of on the rear section of a fuselage of the normal type.

Parts required to build the model Mississipi steam-boat: 11 of No. 1; 19 of No. 2; 2 of No. 2a; 4 of No. 3; 2 of No. 4; 18 of No. 5; 2 of No. 6a; 8 of No. 8; 2 of No. 9; 7 of No. 10; 5 of No. 11; 19 of No. 12; 3 of No. 12a; 1 of No. 13a; 1 of No. 14; 2 of No. 16b; 3 of No. 17; 2 of No. 20b; 1 of No. 23; 2 of No. 24; 2 of No. 35; 170 of No. 37; 6 of No. 37a; 12 of No. 38; 2 of No. 40; 1 of No. 45; 2 of No. 48; 2 of No. 48a; 4 of No. 48b; 1 of No. 48d; 1 of No. 51; 2 of No. 52; 4 of No. 53; 8 of No. 59; 2 of No. 62; 5 of No. 63; 4 of No. 90; 1 of No. 109; 3 of No. 111; 6 of No. 111c; 1 of No. 115; 2 of No. 125; 2 of No. 162a; 2 of No. 188; 2 of No. 189; 2 of No. 190; 1 of No. 191; 3 of No. 193; 3 of No. 195; 4 of No. 197.

The second model to be described has as its prototype an unusual type of aeroplane, the American-built Gyro "Crusader," a four-seater cabin monoplane. The model, which is shown in Fig. 2, is built with Outfit D.

The first part of the model to be built consists of the two tail-booms, on the forward ends of which the engines are carried. Each boom is constructed of a U-Section Curved Plate 1, and to this is bolted two $5\frac{1}{2}''$ Strips 2 and three $2\frac{1}{2}''$ Strips, two of which are shown at 3. The rear ends of the Strips are drawn together and held in position by a Nut and

Bolt, and the Bolt also carries a Flat Bracket, a Flat Trunnion, and a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket. The Flat Trunnion represents one of the rudders, and the $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket carries one end of the tail-plane.

When both tail-booms are complete they are connected together at their forward ends by means of four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. These parts are arranged in pairs and are joined together by their turned-over ends at the centre. One point of connection is indicated at 4. Two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates are fitted to the Double Angle Strips as shown at 5, Fig. 2, and between these two Strip Plates is carried the cabin, which is built up in the following manner. A $2\frac{1}{2}''$ Strip 6 is bent as shown, and is bolted at each end to a bent $5\frac{1}{2}''$ Strip 7. The rear ends of these $5\frac{1}{2}''$ Strips are connected together by a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket, and a second Angle Bracket forms the connection between a Cranked Bent Strip 8 and the cabin. The two outer holes of the Cranked Bent Strip accommodate a Threaded Pin on which is mounted a $\frac{1}{2}''$ loose Pulley. A $5\frac{1}{2}''$ Strip 10 is now added and this carries a bent $2\frac{1}{2}''$ small radius Curved Strip 9. To the ends of this Curved Strip are bolted two $3\frac{1}{2}''$ Strips, and these are fixed in position by means of Flat Brackets and Obtuse Angle Brackets.

The construction of the wings is shown in the photograph. Each propeller is represented by a $2\frac{1}{2}''$ Strip free to turn on a $\frac{3}{8}''$ Bolt. This Bolt is locked in the upper hole of a Flat Bracket, bolted to a Double Bracket that in turn is attached to the front end of the tail-boom.

Parts required to build the model Aeroplane: 13 of No. 2; 2 of No. 3; 13 of No. 5; 9 of No. 10; 4 of No. 11; 9 of No. 12; 2 of No. 12a; 4 of No. 12c; 2 of No. 22a; 1 of No. 23; 89 of No. 37; 4 of No. 37a; 10 of No. 38; 1 of No. 40; 1 of No. 44; 4 of No. 48a; 2 of No. 62; 2 of No. 90a; 4 of No. 111c; 1 of No. 115; 2 of No. 126a; 2 of No. 188; 2 of No. 189; 2 of No. 199.

The model submarine shown in Fig. 3 is built with Outfit D. Each side of this model is built up from three $12\frac{1}{2}''$ Strips 1 and 2, the two Strips 1 being overlapped one hole. The Strip 2 is also connected at the point of joining of the Strips 1, and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is fitted. This Double Angle Strip, together with an Angle Bracket indicated at 3 and a Sector Plate indicated at 4, carries a $12\frac{1}{2}''$ Strip 5 forming the deck. The forward ends of the Strips 1 and 2 are joined together by two Angle Brackets and a Flat Bracket. The $12\frac{1}{2}''$ Strip 6, forming part of the fore-deck, is bolted at its after end to the central $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip already mentioned.

The upper portion of the deck of the model is represented by two $12\frac{1}{2}''$ Angle Girders and a $12\frac{1}{2}''$ Strip 7. The rear end of the upper deck carries two $3\frac{1}{2}''$ Strips 8, and also a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent in the manner shown. The conning-tower is built up from two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates secured at each end to a $1\frac{1}{2}''$ Strip, and also to the upturned flanges of a Double Angle Strip forming the top, by means of four Obtuse Angle Brackets. The small Flexible Plates are fitted to the upper deck of the model by means of $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. The central mast is a $6\frac{1}{2}''$ Rod held in position by two 1" Pulley Wheels, and the periscope is a $3\frac{1}{2}''$ Rod held in place by Spring Clips. The after-mast, a 5" Rod, is carried in one hole of a $2\frac{1}{2}''$ Strip and held in position by a 1" Pulley and Anchoring Spring. A length of Cord is used to represent the aerial and mast stays.

The miniature gun consists of a $1\frac{1}{2}''$ Rod mounted in a Double Bracket and held in place by two Spring Clips.

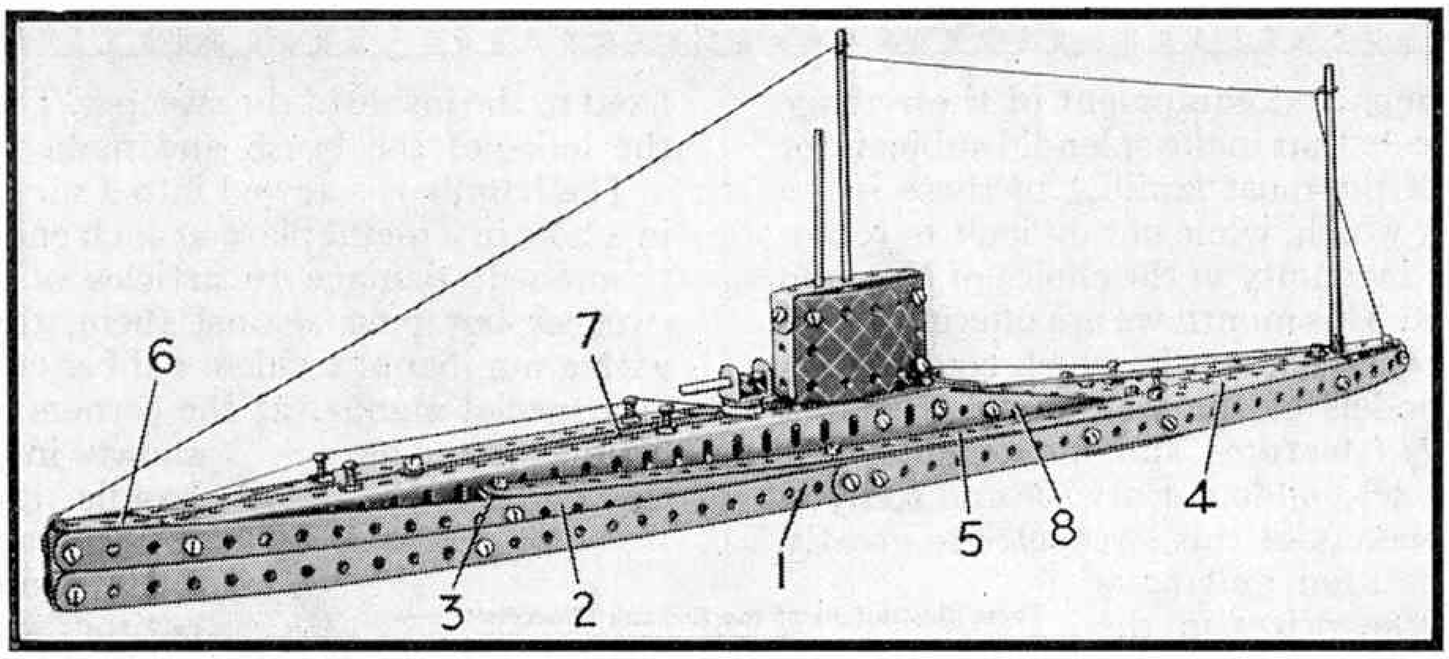


Fig. 3. A neat and interesting model of a submarine. An extremely realistic effect is obtained by the skilful use of only a few parts.

Parts required to build the model Submarine: 10 of No. 1; 2 of No. 3; 1 of No. 5; 2 of No. 6a; 2 of No. 8; 3 of No. 10; 4 of No. 11; 7 of No. 12; 1 of No. 14; 1 of No. 15; 1 of No. 16; 1 of No. 18a; 3 of No. 22; 1 of No. 23; 1 of No. 24; 5 of No. 35; 56 of No. 37; 6 of No. 37a; 5 of No. 38; 1 of No. 40; 1 of No. 48; 3 of No. 48a; 1 of No. 54a; 6 of No. 111c; 1 of No. 176; 2 of No. 188; 1 of No. 189.

Tailless aeroplanes resemble the pterodactyl, or "flying dragon" of prehistoric times in appearance and they have been developed in efforts to provide a machine that is stable in itself and proof against errors in piloting. The prototype of the model shown in Fig. 4 is the Westland-Hill "Pterodactyl" MK.V, a two-seat fighter. The fuselage is constructed from two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates that are curved slightly at their rear ends and joined together by a U-Section Curved Plate. The front ends of these Plates are joined in a similar manner. Two $2\frac{1}{2}''$ small radius Curved Strips 1 are next fastened to the bottom of the fuselage, and these carry two $1\frac{1}{2}''$ Rods on which 1" loose Pulleys are free to rotate. These Pulleys represent the landing wheels. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 2, bent into the shape of a U forms the front of the cockpit, and the front of the rear cockpit consists of a Double Bracket 3 and two Flat Brackets.

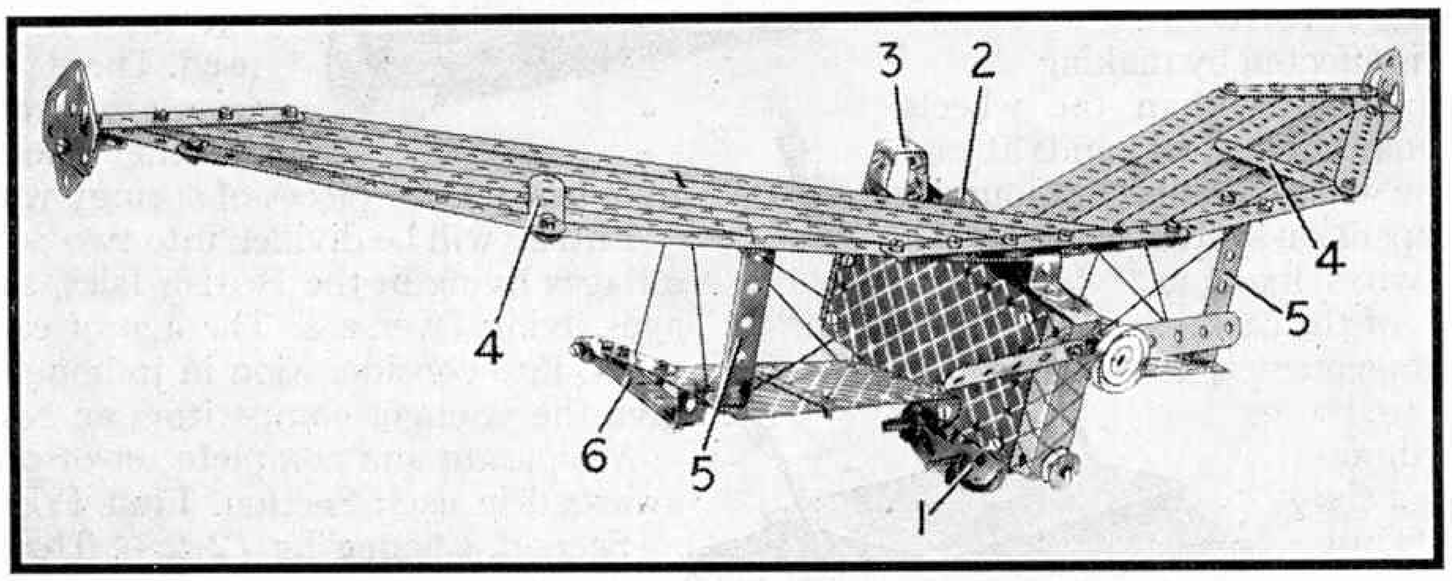


Fig. 4. A clever representation of the Westland-Hill "Pterodactyl" MK.V, a two-seat fighter.

The upper wing is built from a series of $12\frac{1}{2}''$ Strips secured to a framework of $5\frac{1}{2}''$ and $3\frac{1}{2}''$ Strips and clamped neatly in position by the $2\frac{1}{2}''$ Strips 4. The outer ends of the wings carry steering fins that are built up from Trunnions and Flat Trunnions. The lower wings are each formed from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates connected to the upper wing by means of the Double Angle Strip 5. A $2\frac{1}{2}''$ Strip 6 is now added, and this is secured to the end of the wings by a $1\frac{1}{2}''$ Strip and $\frac{1}{2}''$ Reversed Angle Bracket. The $1\frac{1}{2}''$ Strip is extended by means of an Obtuse Angle Bracket, and the Bolt securing this part to the Strip 6 also clamps in position a $\frac{3}{8}''$ Bolt disposed horizontally.

Parts required to build the model "Pterodactyl": 8 of No. 1; 12 of No. 2; 2 of No. 3; 12 of No. 5; 2 of No. 6a; 3 of No. 10; 1 of No. 11; 6 of No. 12; 1 of No. 12a; 1 of No. 12c; 2 of No. 17; 1 of No. 22; 2 of No. 22a; 1 of No. 23; 8 of No. 35; 64 of No. 37; 2 of No. 37a; 5 of No. 38; 1 of No. 40; 2 of No. 48a; 2 of No. 90a; 2 of No. 111c; 1 of No. 115; 3 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 188; 2 of No. 190; 2 of No. 191; 2 of No. 193; 2 of No. 199.

The Ewbank Carpet Sweeper

British Firm Offers Cash Prizes for Meccano Models

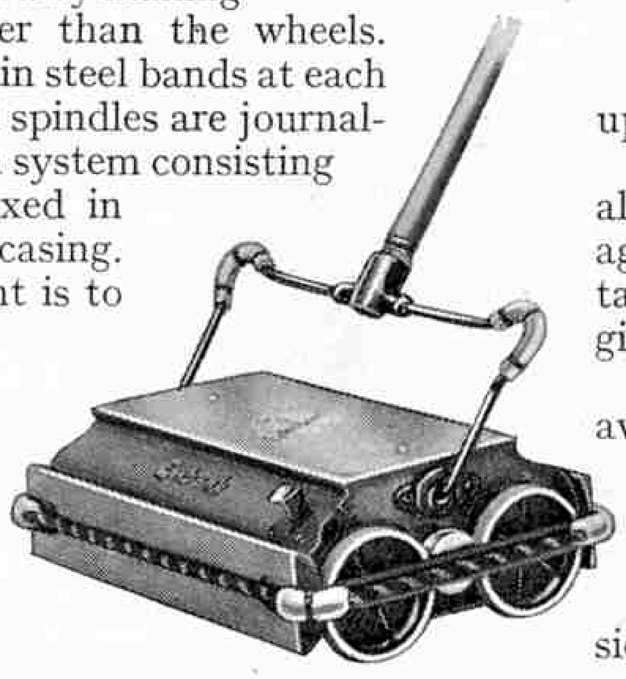
AMONG the furnishings and equipment of the average home are many objects that make splendid subjects for Meccano models. One of the most familiar of these is the domestic carpet sweeper which, while not difficult to reproduce, provides scope for ingenuity in the choice of Meccano parts used for building it. This month we are offering handsome cash prizes in a special contest in which competitors are asked to submit models of the well-known Ewbank Sweeper, which possesses features and movements that make it attractive to model-builders. Entwisle and Kenyon Ltd., Accrington, the makers of this sweeper, are greatly interested in the competition and have kindly offered to give the prizes in the Home Section.

The illustrations on this page show a general view and an underneath view of a Ewbank "Success" Sweeper. Sweeping is effected by a brush that revolves inside a polished wooden casing, and is driven by friction from the four wheels on which the sweeper travels. The wheels are provided with rubber treads and these make contact with brass collars mounted on the ends of the brush shaft. In action the sweeper is simply pushed over the carpet and the motion of the wheels is transmitted to the brush, which is caused to revolve rapidly and flick any dust or dirt it encounters into the dust pans. It is necessary that the brush should revolve at a high speed, and this is effected by making the brush collars much smaller than the wheels.

The brush spindle is mounted in steel bands at each end of the casing, and the wheel spindles are journalled in a simple spring suspension system consisting of curved spring steel wires fixed in position outside the ends of the casing. The purpose of this arrangement is to enable varied pressure to be put on the sweeper brush according to the thickness of the carpet being swept. Only slight pressure is necessary on a thick carpet, and heavier pressure is applied when a thinner one is being cleaned.

Along each side of the brush there is a hinged dust pan, each dust pan being carried on a pivot fixed in each end of the casing. The dust pans close the space between the brush and the casing. To remove dust collected in them it is only necessary to depress a small lever at one end of the casing. This causes the hinged pans to snap outward under the action of powerful springs, and to throw out the dust. By sliding this lever forward when fully depressed the dust pans are locked open to permit internal examination of the container. For the purpose of removing fluff and bits of cotton from the brush a strip of metal with projecting teeth spaced about $\frac{1}{2}$ in. apart is fixed to the inside of the sweeper. The teeth project between the hairs of the brush and make an effective scraper.

The handle is screwed into a metal yoke that is pivoted in a hole in a metal plate at each end of the casing. In order to prevent damage to articles of furniture through the sweeper bumping against them, the sweeper is provided with a number of resilient rubber cushions. These are fixed in a special manner at the corners of the case and on the handle yoke, as shown in the illustration, while the end of the handle itself is fitted with a rubber cap.



These illustrations of the Ewbank "Success" Carpet Sweeper will help entrants in the model-building competition announced on this page. One gives a general view of the Sweeper and the other shows the underside, with the dust pans opened to reveal their construction.

It is not expected that competitors will be able to reproduce accurately every mechanical detail of these sweepers or that they will be able to make their models actually sweep, and so long as a model demonstrates the essential features of their construction and outward appearance it will stand a good chance of winning a prize. There is a good opportunity for showing originality in devising suitable materials for representing the rotating sweeping brush, and no restriction is enforced on the choice of materials for this purpose. For example, on models of suitable size a piece cut from a bottle brush could be used. These brushes can be obtained from any chemists for a few pence. Another idea would be to build up a brush from pieces of springy wire.

Entries will be divided into two Sections, A for readers of all ages living in the British Isles, and B for readers of all ages living Overseas. The age of each competitor will be taken into consideration in judging the entries in order to give the younger competitors an equal chance of success.

A separate and complete set of prizes as follows will be awarded in each Section. First Prize, Cheque for £3/3/–; Second, Cheque for £2/2/–. Third, Cheque for £1/1/–. There will be also a number of consolation prizes.

The actual model must not be sent. What is required is a photograph or drawing giving an adequate impression of the design and construction of the model, and this may be accompanied by a few words of description if considered necessary. The model must be built by the competitor himself without any assistance, but the drawing or photograph may be prepared by others if necessary.

The competitor's age, name and full address must be written on the back of each photograph or drawing sent in. Entries should be addressed to "Carpet Sweeper Contest," Meccano Ltd., Binns Road, Liverpool 13. The closing date for entries in the Home Section will be 31st December, 1936, and for Overseas entries 27th February, 1937.

The entries will be judged by Entwisle and Kenyon Ltd. and Meccano Ltd. jointly.

Model-Building Competition Results

By "Spanner"

Ingenious Small Models by Overseas Readers

May "Simplicity" Contest (Overseas)

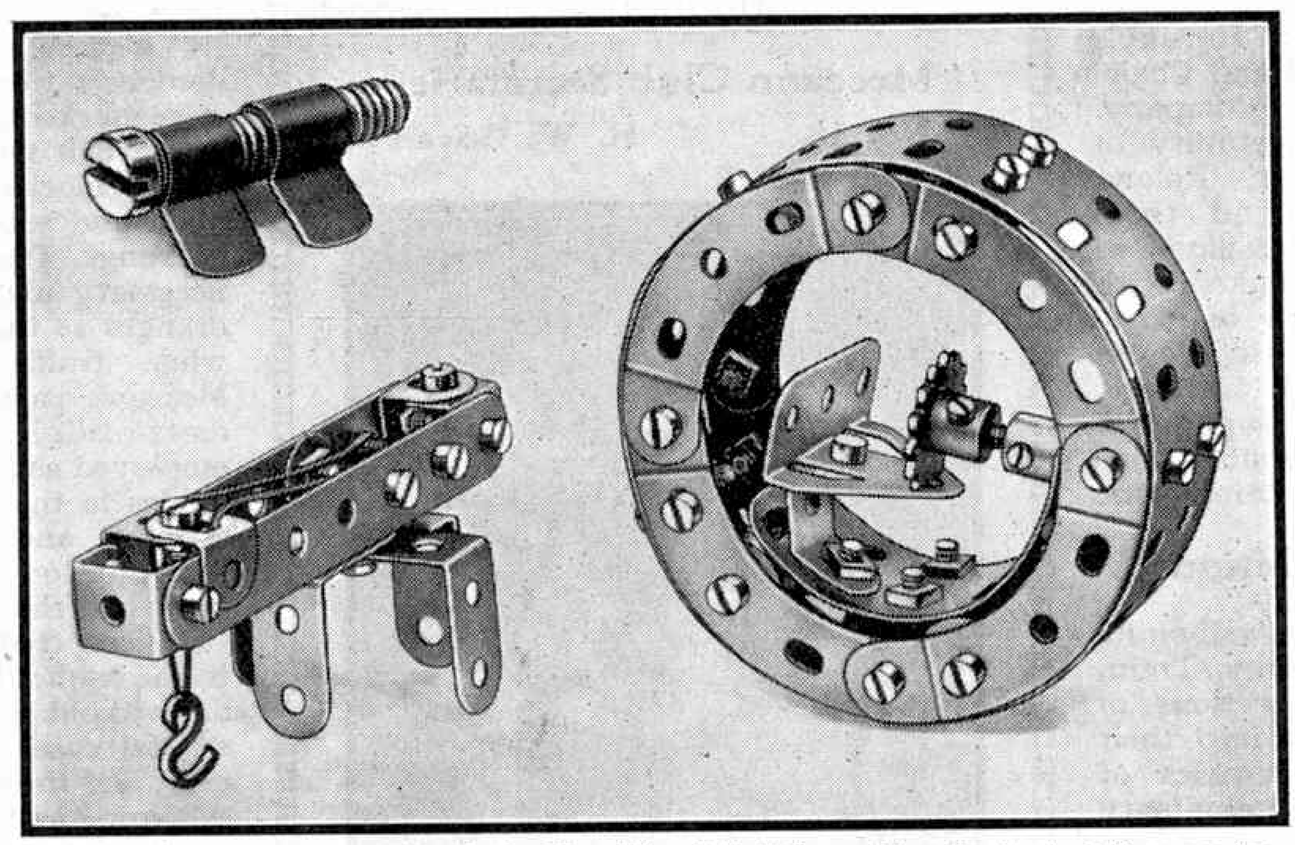
A notable feature of the Overseas Section of the Competition was the large number of competitors who were sending in entries in "*M.M.*" Model-building Contests for the first time. Many of these were successful in winning prizes, and I hope that their early successes will encourage them to become regular competitors and that other model-builders will follow their example.

The list of awards is as follows: 1st Prize, Meccano products value £3/3/–: L. Dumont, Charlottetown, Canada. 2nd, products value £2/2/–: D. Murison, Buenos Aires. 3rd, products value £1/1/–: H. Guallart, Buenos Aires.

Products value 10/6: A. Turton, Ottawa, Canada; H. Dressler, Breslau X, Germany; J. Oleaga, Buenos Aires; J. Cruse, Wellington, N.Z.; G. Myburgh, Claremont, Capetown.

Products value 5/–: R. Hill, Toronto; N. Vung, Shanghai; L. Edwards, Hokianga N.Z.; B. Walsh, Nelson, N.Z.; R. Plewman, Johannesburg.

Three of the most interesting models entered in the contest are illustrated on this page. The base of the simple hammerhead crane built by L. Dumont consists of four 1″ × 1″ Angle Brackets bolted together by a $\frac{3}{8}$″ Bolt that projects upward. Loose on this bolt is a Double Bracket locknutted to keep it in position. Two 3$\frac{1}{2}$″ Strips bolted to the Double Brackets as shown form the jib, and at one end they are connected by a Double Bracket and at the other by two $\frac{1}{2}$″ × $\frac{1}{2}$″ Angle Brackets. The winding drum is a $\frac{3}{4}$″ Bolt and the travelling carriage from which the hoisting hook is suspended is made from two $\frac{1}{2}$″ × $\frac{1}{2}$″ Angle Brackets bolted through their elongated holes. The hook is a small piece of bent wire. The judges were impressed by the clever way in which the builder had reproduced in a simple manner the main features of such a large prototype.



Ingenious models that won prizes in the May "Simplicity" Competition. In the top left corner is a Dachshund by D. Murison, and beneath it is L. Dumont's hammerhead crane. The simple dynasphere on the right was built by H. Guallart.

One of the smallest "simplicity" models that I have yet seen was submitted by D. Murison. It is the Dachshund illustrated on this page, and awarded Second Prize. No doubt readers with imagination will see in it a likeness to several other members of the animal and insect kingdom, but it certainly gives a very good impression of one of these lengthy German dogs. It consists of only three parts, one $\frac{3}{4}$″ Bolt and two Spring Clips, and is an outstanding example of what can be done with limited resources.

The third model illustrated is a reproduction of the dynasphere shown on the cover of the "*M.M.*" for February 1935, and was built by H. Guallart. The large wheel consists of two built-up circles of 2$\frac{1}{2}$″ small radius Curved Strips, which are connected round their rims by Flat Girders bent to shape. The power unit, which in the real dynasphere remains horizontal while the road wheel is revolving, is a 3″ Flat Girder, fitted with a Rod Socket and a Double Bracket. The former holds a $\frac{3}{4}$″ Bolt on which is a $\frac{3}{4}$″ Sprocket for the steering wheel. The driver's seat is a Trunnion bolted to the Double Bracket, and the whole unit is held inside the wheel by two 1″ Screwed Rods. Underneath the power unit are four $\frac{1}{2}$″ loose Pulleys that are bolted to the circles of Curved Strips. This competitor submitted also a miniature merry-go-round and a small monoplane, but I think the dynasphere is the most cleverly built model of the three.

The base of the merry-go-round is a geared disc taken from a Ball-bearing, the flanged disc of which is used for the roof. A Sleeve Piece held on a Rod by means of a $\frac{3}{4}$″ Flanged Wheel and a Chimney Adaptor forms the centre pillar, and Eye Pieces are used to represent the cars.

"Small Outfits" Competition (Overseas)

This contest was designed specially to encourage younger model-builders and those who possess only the smaller Meccano Outfits to try their skill in building models based on their own ideas. The large number of entries received shows that the opportunity thus provided for these boys and girls to add to their stock of parts by winning a prize was fully appreciated. The successful competitors are as follows:

1st Prize, products value £2/2/–: J. Winborn, Christchurch, N.Z. 2nd, products value £1/1/–: W. Ingle, Johannesburg, S.A. 3rd, products value 10/6: D. Hutt, Hamilton, N.Z.

Products value 5/–: J. Forrester, Montreal; J. Carter, Capetown; J. Nie, Shanghai; Y. Nai Kong, Shanghai; R. Miller, Claremont, Ontario; E. Aronson, Hedemora, Sweden; J. Walter, Fort Brown, S. Africa; M. Nicholls, Pietermaritzburg; M. Choon, Kingman, Alberta; M. Jones, Melbourne.

I am sorry that I am unable to illustrate the interesting motor cycle model that won First Prize. It evidently is copied from a very old type of machine, and it gives the impression of being a miniature of one of the first produced. The body of the model is formed with a No. 1 Clockwork Motor, which is fitted at one end with Strips that support the rear wheel axle, and at its other end with a strong projecting arm of Strips reinforced to form the head-lock bearing. The rear wheel axle is driven from the Motor by means of a belt. The model is rather crude, but this is only natural considering the few parts used in building it, and it is obvious that Winborn has endeavoured to make the best use of the parts at his disposal. He deserves encouragement and the prize that he has won in this contest will enable him to construct much more elaborate models. I hope that he will submit some of these for future competitions.

An amusing model representing a policeman on point duty earned Second Prize for W. Ingle. Neat construction is the main feature of this entry, which although simply built is remarkably life-like and gives a good impression of action. The policeman is mounted on a 5$\frac{1}{2}$″ × 2$\frac{1}{2}$″ Flanged Plate and his body consists of two Flanged Sector Plates and his legs and arms of Strips, one arm being raised to hold up traffic.

After examining the first two models I should not have been surprised to find that the next was either a "black-maria" or an ambulance! Actually, however, it is a fine little model of a Schneider Trophy seaplane, the fuselage being a boxlike structure made from four 5$\frac{1}{2}$″ Strips and Double Brackets. The tail is made from two Trunnions, and each main plane consists of three 2$\frac{1}{2}$″ Strips. Strips are used also for the propeller, undercarriage and floats.

Novel "Short Story" Contest

1st Prize, products value £2/2/–: Miss M. Robinson, Dunton Bassett. 2nd, products value £1/1/–: L. Wright, Pengam, Glam. 3rd, products value 10/6: W. Whitaker, Hornsea.

Products value 5/–: M. Maddock, Carbonear, Newfoundland; D. Murison, Buenos Aires; F. Phillips, Ashton-in-Makerfield; A. O'Neill, Glasgow, S.2; J. Woods, Liverpool 21; D. Byrne, Brynteg, Nr. Wrexham; G. Ashwell, London, S.W.4; F. Giles, Sheffield 8; G. B. Milling, Lindsay, Ontario; N. Adamson, Wairoa, N.Z.

"Most Useful Parts" Voting Contest

1st Prize, products value £2/2/–: J. Reid, Pietermaritzburg, S. Africa. 2nd, products value £1/1/–: C. Brett, Great Coates, Lincs. 3rd, products value 10/6: L. Edwards, Hokianga, N. Zealand.

Products value 5/–: D. Webb, Transvaal, S. Africa; J. Riddell, Glasgow E.1; B. Turner, Henfield Sussex.

The Guild President

All members of the Guild will join with me in sincere regrets at the passing of Mr. Frank Hornby, its founder and first President. Few men have done more for boys than Mr. Hornby, who provided them with really worth-while hobbies and, through the Guild and the Hornby Railway Company, encouraged them to think and act for themselves, to help others and to prepare to play their parts in life thoroughly and manfully.

Many members have written anxiously enquiring who is to take Mr. Hornby's place as President of the Guild and Chairman of the Hornby Railway Company. I am glad to take this opportunity of announcing that his son, Mr. Roland Hornby, has undertaken to fill these responsible positions. Thus the name of Hornby will continue to be linked with these world-wide organisations of boys.

On page 613 appears a message from Mr. Roland Hornby, who, I am sure, will be able to command the support of every member of the two organisations in his great task of furthering their interests.

The Christmas Exhibition

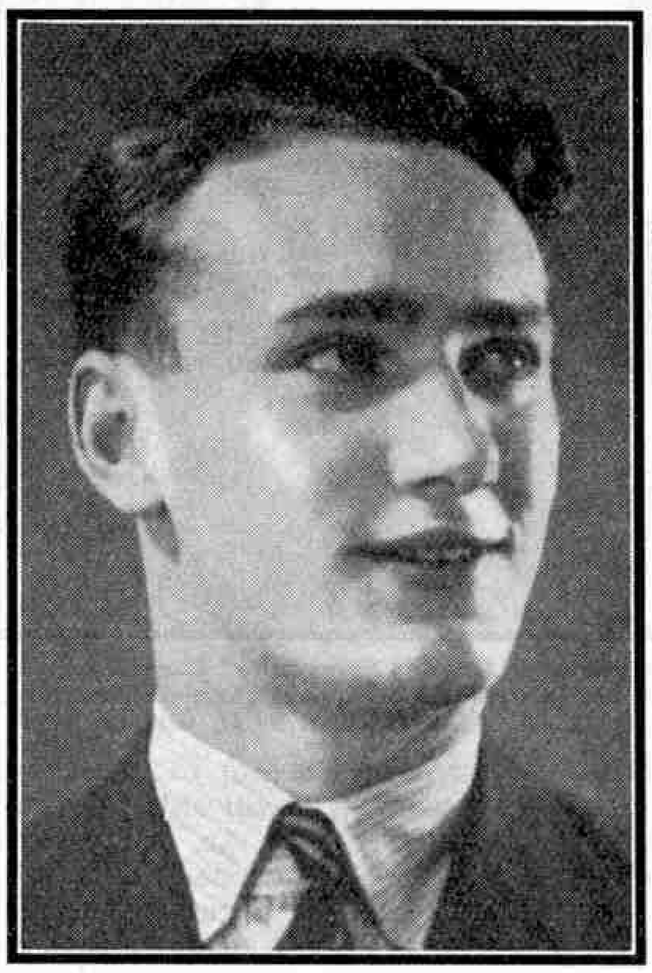
The first winter session is now well on its way, and the Meccano, Hornby Train, fretwork and various other sections of club life have got thoroughly into their stride. The Leaders and secretaries of many clubs are already making preliminary arrangements for an Exhibition toward the close of the session. It is advisable to make a start at once with these preparations, particularly if it is intended to obtain demonstration models on loan from Headquarters, as at least five weeks' notice is needed to ensure their being available by the required date. Time also is saved by giving full details of the electric supply available, in order that a suitable motor can be fitted to each model.

Those who do not already possess a list of the models available for loan to clubs for display at Christmas and New Year Exhibitions can obtain one on writing to me. The list is comprehensive and varied, and the models themselves are of very handsome appearance. For the information of new clubs, I would like to mention again that very little expense is incurred in including one or more of these splendid working models in a club display, for it is only necessary to pay the return carriage, the amount of which depends on the size of the models and in no case is more than a few shillings.

I am very pleased to publish on this page a notice concerning the forthcoming Sid-Vale M.C. Exhibition, and I shall be delighted to perform a similar service for any other club, if the Leader of it will send me particulars. On several occasions notices of this kind have led to the acquisition of keen Meccano enthusiasts as new members. The "*M.M.*" goes to press early, and notices therefore should be sent to me at least a month in advance of the date of publication, but I can still include notices of Exhibitions in December in the next issue if I receive details within the next few days.

Meccano Club Secretaries

No. 38. H. W. Govan



H. W. Govan is secretary of the St. Giles' Cathedral (Edinburgh) M.C., one of the largest clubs in the Guild. Model-building, Games and Lectures are among its many activities, and with the associated Branch of the H.R.C. operates two extensive Hornby layouts.

A Meccano "Safety First" Demonstration

There is a refreshing originality in many of the schemes devised in modern Meccano clubs, especially those in which members keep in touch with current events and plan their model-building and other activities to serve some practical purpose. I should like officials to keep a keen look out for opportunities of introducing novelties of this kind into their programmes.

Sutton Valence Council School M.C. have set a fine example in this respect by a carefully planned "Safety First" demonstration. The grounds of the school were marked out by chalk lines to represent a typical section of a town, including island blocks of shops and offices, with main and secondary roads and pedestrian crossings. Traffic signs were erected where necessary and Belisha beacons, with real oranges as their heads, were also in place, while traffic signals constructed from Meccano parts were in operation at two cross-roads. The club members were employed as "police," or as attendants and guides to the many visitors to the demonstration, and other boys from the school, seated in toy motor cars or astride bicycles, provided the necessary road traffic.

It is a credit both to the "police" and to the traffic that the demonstration passed off without a single accident. There were several cases of excessive speeding, however, and these were dealt with by Meccano solicitors and magistrates at the "police court," one of the classrooms in the school. In another room was a Safety First village, elaborately laid out and planned to provide for the needs of modern traffic, with Dinky Toy models to demonstrate the rules of the road and the need for "Safety First."

Visitors to this topical and original display praised the efforts of the club very highly, and dwelt particularly on its practical value as a help in reducing the number of road accidents.

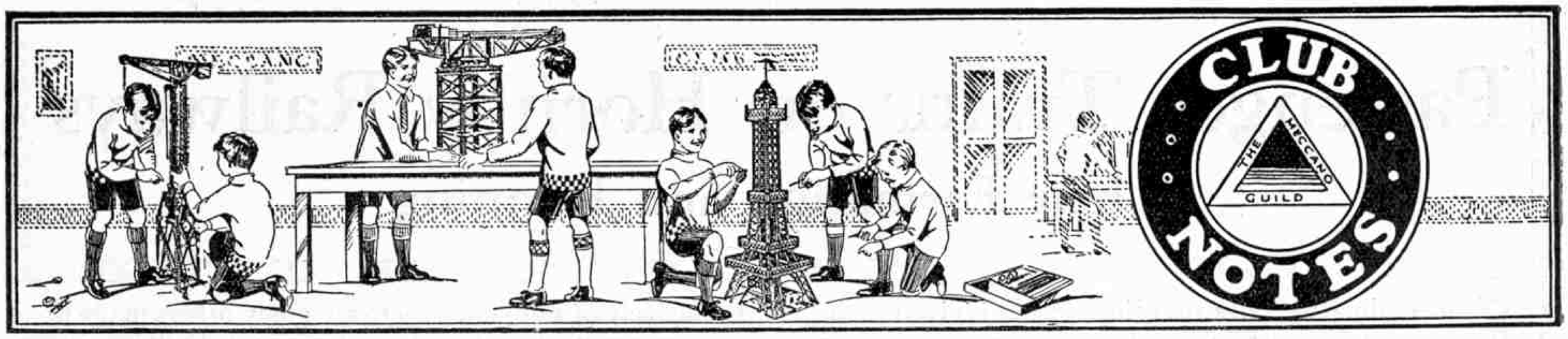
* * * *

The Sid-Vale M.C. will hold their Annual Exhibition in the Congregational schoolroom, off Church Street, Sidmouth, on 10-13th November, 1936. On the 10th, 11th and 13th it will be open from 6 p.m. to 9.30 p.m., and on the 12th from 2.30 p.m. to 9.30 p.m. Admission will be free, but a collection will be taken in aid of club funds.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

BELFAST—T. M. Emery, Bedell House, Methodist College.
CANADA—T. K. Campion, 102, Queen Street, St. Catherines, Ontario.
INDIA—N. S. Narang, Shish Mahal Road, Lahore.
NELSON—D. Holt, "Ivy Lea," Barkerhouse Road.
SOUTH SHIELDS—R. Gale, 11, Cedar Grove, Cleadon Park.



Wednesbury M.C.—Inclement weather has reduced outdoor activities, and most meetings have been held in the club-rooms, when model-building and fretwork have occupied the members. The seniors have redecorated the rooms. The upper half of each wall has been painted white and the lower half brick-red, with striking effect. Some good games of Cricket have been played, and a ramble from Wolverhampton, during which the party walked about 12 miles, proved a very enjoyable outing. Visits to several local places of interest, including the Central Fire Station, Birmingham, have been arranged. A recruiting campaign is to be organised. Club roll: 18. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.

Sid-Vale M.C.—Some very interesting rambles have been held, games being played when the destinations were reached. During a ramble along the permanent way to Tipton St. John, for which permission was obtained, the party were shown over a junction signal box. In a "Buildings" Contest many excellent models of churches, houses, and a railway station were entered. Club roll: 20. *Secretary:* L. R. J. Gliddon, Sheffield House, Sidmouth.

Plymouth M.C.—Visits have been paid to the Friary (S.R.) Engine Sheds, and to the Dewerstone, one of the Dartmoor tors, at Shaugh, where members were also interested in the old railway. A Visit to Yelverton was made specially enjoyable by a Treasure Hunt and races across the moor. A "backward" race across rough moorland for officials only greatly amused members, those taking part carrying out many remarkable unintentional gymnastic feats. A special issue of the "*Gear Box*" is to be produced to celebrate the club's 10th birthday. A second magazine is to be produced on the club press, and special editions of it will be sold to clubs in Devon and Cornwall who do not issue one. It has been decided to elect an Advertising Manager to seek advertisements for the magazines. The Library is to be re-opened. *Secretary:* R. G. Symons, 47, Lisson Grove, Mutley, Plymouth.

St. Stephen's (Saltash) M.C.—Games have been played during two outdoor meetings, and Model-building and Table Tennis have been the chief features of indoor work. Models completed include a yacht, revolving hammerhead crane, and a tennis umpire's seat; and the main block of buildings on the model of Millbay (G.W.R.) Station has been completed. The Model-building Section continues to be busy making cupboards in which to store the club stock of Meccano parts. One member is building a model of a United States cruiser. Club roll: 8. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Exeter M.C.—Special attention is being paid this session to operations with Dinky Toy vehicles on the model road layout. Recent models completed have included one of Blackpool Tower, an air liner, cabin motor boat, speed indicator and several types of motor vehicles. Club roll: 36. *Secretary:* E. Ashwood, 188, Pinhoe Road, Exeter.

Bexleyheath Boys' Central School M.C.—A visit to the Science Museum, South Kensington, proved very enjoyable, and the party were specially interested in the model of Stephenson's "*Rocket.*" A fine model of a gantry crane, driven by an electric motor, was exhibited at one meeting, and at another a Talk on "*How an Aeroplane Flies*" was enjoyed. Club roll: 30. *Secretary:* D. Hicks, 4, St. Audrey Avenue, Longlane, Bexleyheath.

Enfield Grammar School M.C.—The club's second Exhibition was held in connection with the School Fête. It was arranged in two rooms, and the chief features in the first were the ever-popular Meccanograph, an electric crane, model aeroplanes, and a ¾ in. scale model of a G.N.R. "Atlantic" locomotive, complete with train. This locomotive can haul six adults at 8 m.p.h., and it is hoped to have it working at the next Exhibition. The second room contained other attractive Meccano models, and the club layout, which was operated to timetable. At the end of the day the club was able to hand over £3/10/- to the School fund. The track used at the display is to be replaced by a new one completely track-circuited and controlled from a signal box worked on the system now in use on the L.N.E.R. at Thirsk. Club roll: 35. *Secretary:* J. H. Pettifer, 31, Goat Lane, Forty Hill, Enfield.

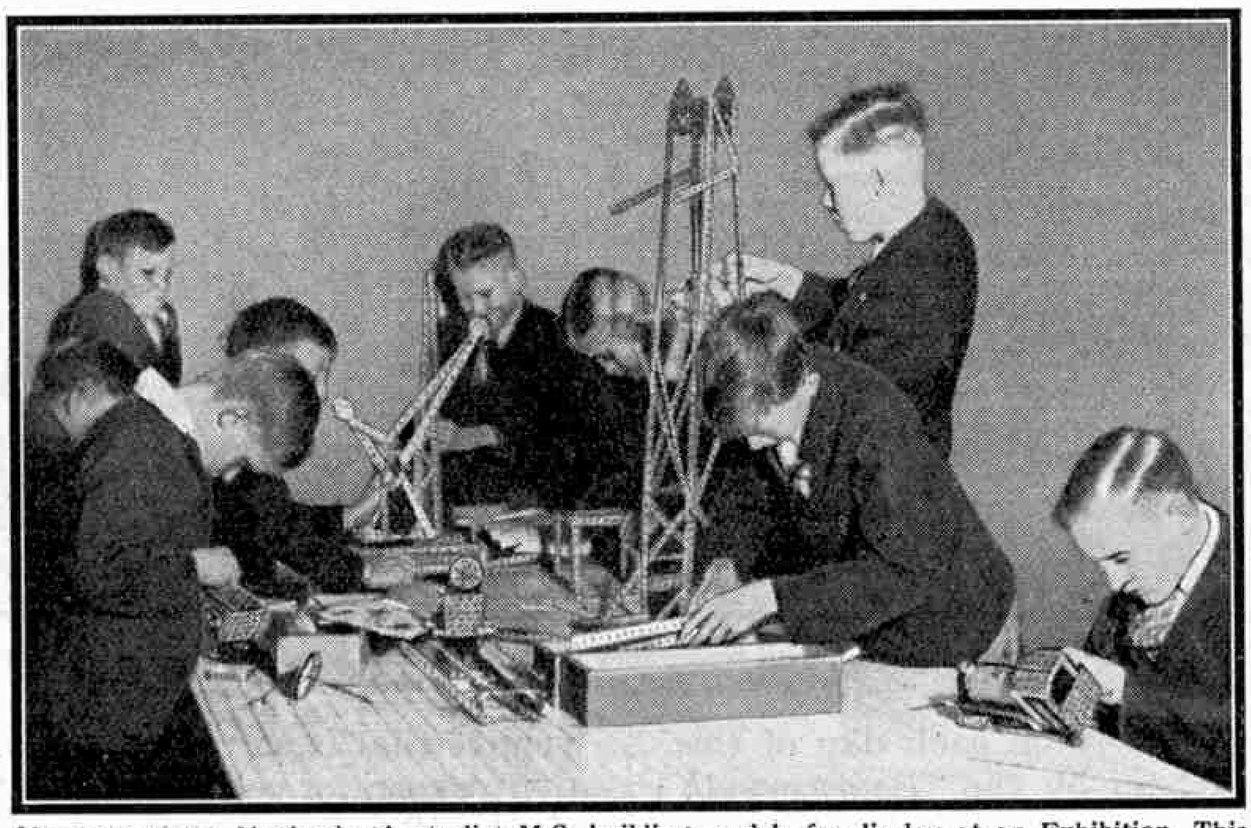
Islington M.C.—The Leader has given an interesting talk on "*Curious Jobs.*" The chief feature of recent Model-building meetings has been the construction of various types of aeroplanes, but other subjects have not been neglected, and an excellent model of a gantry crane has been completed. Fretwork and chemical experiments have been carried out. Preparations are in hand for the club Exhibition. Club roll: 18. *Secretary:* K. V. Dines, 70, Thornhill Road, Barnsley, London, N.1.

St. Giles' Cathedral (Edinburgh) M.C.—New club-rooms have been obtained in a central part of the city. Partitions have been erected to divide the space available to the best advantage, and two of the rooms created have been named "H. N. Gresley Railway Room" and "Cecil J. Allen Railway Room" respectively. Both have been equipped with strong baseboards at a height of about 3 ft., and about 200 ft. of Hornby track has been laid in the Gresley room. Another room contains two heavy benches and is used for model-building, fretwork and wireless, and a fourth one is utilised for games, lectures and committee meetings. Many new members are required so that full advantage can be taken of these excellent facilities, and the secretary will be glad to hear from any local Guild member who would like to join. *Secretary:* H. W. Govan, 18, Ravelston Park, Edinburgh 4.

Hornsea M.C.—Outdoor activities have included a picnic in a wood and a cycle run to Burton Constable Hall, where the party were greatly interested in the old furniture and many fine pictures in the various rooms. They also inspected the extensive gardens. During an excursion to Hull the members visited the Alexandra (L.N.E.R.) Dock, where they were allowed to inspect a Danish ship. In the town they visited the Regal Cinema, and by kind permission of the Manager they were privileged to see inside the projection room. Another outing was to the residence of a Mr. Drys, who possesses a fine model railway. He allowed the members to take their "Flying Scotsman" with them and to operate it on his steel track. Much interest was taken in an excellent steam locomotive owned by Mr. Drys. Club roll: 12. *Secretary:* P. Thom, 5, Alexandra Road, Hornsea.

Fraserburgh M.C.—At one outdoor meeting a member of the flying section brought his "Frog" aeroplane and a model Bird-man. Both models flew exceptionally well. A visit was paid to the Empire Air Display promoted by the late Mr. T. Campbell Black when it visited the locality, and many members enjoyed flights in spite of the very cold weather. Club roll: 28. *Secretary:* W. J. Dawson, Phingask, Fraserburg.

Mallow M.C.—A grand Reunion was held to mark the opening of the first winter session. The club stock of Meccano and Hornby has been overhauled. Several interesting lectures by local gentlemen have been arranged. An extensive and varied programme has been planned for this and the second winter session, and members are very enthusiastic. Club roll: 12. *Secretary:* M. D. Hickey, 42, Ballydaheen, Mallow, Co. Cork, I.F.S.



Members of the Maylands (Australia) M.C. building models for display at an Exhibition. This club was affiliated in February 1936, and is making excellent progress. Photograph by courtesy of West Australian Newspapers Ltd., Perth, West Australia.

AUSTRALIA

Thebarton (Adelaide) M.C.—This club is making rapid progress, and all members are very enthusiastic. Lectures are very popular, and as there is no lack of volunteers to give them, they figure prominently in the club programme. Some of the many and varied subjects dealt with have been "*The Building of the Forth Bridge,*" "*Glass Blowing,*" "*Gold Fish Breeding*" and "*Bee Keeping.*" Places of interest visited recently by the club include the locomotive works of Southern Australian Railways, a motor body-building factory, a telephone exchange, newspaper printing works, engineering works and foundry, and a reservoir under construction at Mount Bold. Club roll: 65. *Secretary:* D. C. Tweedie, Technical High School, Ashley Street, Thebarton, Adelaide, South Australia.

Maylands M.C.—A model harbour complete with docks, quays, cranes, railways and warehouses is to be an outstanding feature of the next club Exhibition, for which preparations are being made. The club has been visited by a representative of "*The Western Australian,*" and as a result a detailed and very favourable account of the club and its useful activities appeared in that paper. A Debate on "*Is War Worth While?*" produced some very interesting speeches. A Visit to the "*Daily News*" offices was much enjoyed. Club roll: 30. *Secretary:* M. Thomson, 13, Kennedy Street, Maylands, West Australia.

EGYPT

Cairo M.C.—Good progress is being made and the membership is increasing. The most popular activities are model-building, stamp collecting and correspondence with Guild members in other countries. Visits have been paid to Alexandria, Port Said and other coastal places, and a moonlight trip to the Pyramids was greatly enjoyed. While the party rested there before making the return journey one of the members entertained the others by singing songs. At one meeting the Leader gave an interesting talk on "*The uses of collecting Stamps and Coins.*" Club roll: 30. *Secretary:* Mohed Kamel Salem, 14, Bibars Street, Cairo.

Zagazig M.C.—Interesting competitions and debates have been held. When the subject "*Is Road Transport better than Rail?*" was debated, there was a very lively discussion, and the final result was a majority in favour of railways. A Mock Trial proved very amusing. It is proposed to establish a club library, each member giving a few books to provide an opening stock. Members camped at Bebasta Hill for several days, and there inspected ancient monuments and carried out simple excavation work, discovering interesting relics. Club roll: 19. *Secretary:* Miss B. Mangourie, 39B, Gannabiet Sikka, Hadid Avenue, Zagazig.

INDIA

Ranjit (Lahore) M.C.—The membership is increasing, and all are very enthusiastic. A trip by road and rail to the hill stations of Kulu and Simla, a total distance of 430 miles, has been arranged. On the way the party will visit Jogindar Nagar, the head of the hydro-electric scheme for the whole of the Punjab, where they will inspect the power station and see the huge generators at work. Club roll: 21. *Secretary:* S. Harbhajan, 689, Krishna Bazar, Gowalmandi, Lahore.

SOUTH AFRICA

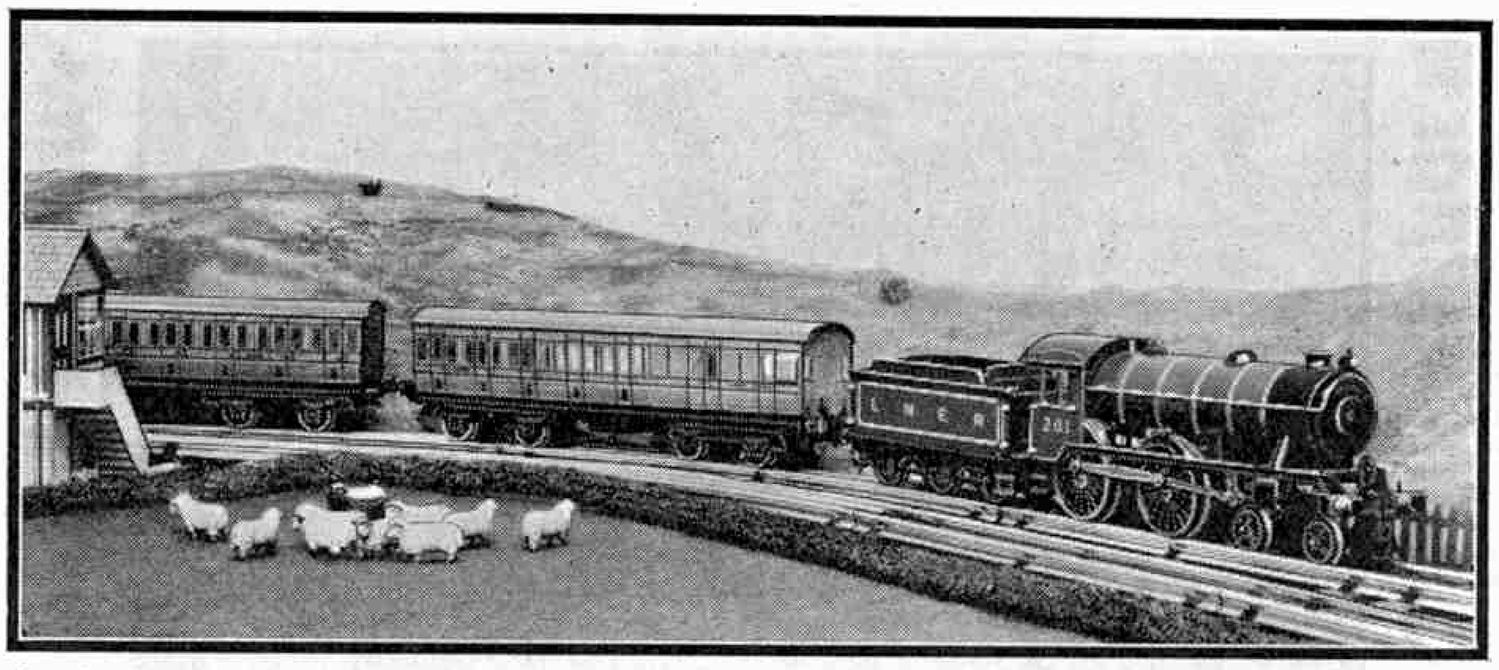
Pioneer M.C.—Model-building and the Boys' Brigade continue to be the chief activities. Preparations are in hand for an Exhibition, and the members are working in pairs on the construction of the many models required. Club roll: 10. *Secretary:* A. H. Alley, 461, Burgers Street, Pietermaritzburg, Natal.

Passenger Trains on Hornby Railways

Their Formation and Running

ON most miniature railways pride of place is given to the passenger train services, and these can be carried out in a thoroughly realistic and interesting manner. The planning of services, the correct formation and despatch of trains, and the arrangement of specials for various purposes, form a very fascinating part of the general working of the line. In this article it is proposed to deal with various points of interest in connection with this subject.

The most important trains on many layouts are made up of Hornby No. 2 Special or No. 2 Pullman Coaches. With these practically all the business or pleasure services of real practice on which Pullman accommodation is the rule can be operated. On miniature L.N.E.R. systems the "*Queen of Scots*" or the "*Yorkshire Pullman*" can be run, and the correct naming of such trains by means of specially prepared name-boards will add considerably to their interest. An unusual type of Pullman train, also on the L.N.E.R., is the "*Eastern Belle*," which runs during the Summer season on various routes of the former Great Eastern Railway from Liverpool Street, and serves a different resort on each day of the week! Similar traffic is catered for by the "*Bournemouth Belle*" of the S.R., which, from being a seasonal train only, has now developed into a regular all-the-year-round service.



A main line stopping train on a Hornby layout representing the L.N.E.R. The No. 2 Coaches composing the train are correctly arranged with a Brake-Third vehicle next to the engine.

Particular interest is attached to trains that run in connection with steamer sailings, and for this reason "*The Golden Arrow Limited*," or any of the Southampton "*Ocean Liner*" specials of the S.R., are well worth reproducing in miniature. It is distinctly thrilling to run such trains as "The Boats," as they are known to the staff, for "Continental" or "Transatlantic" traffic on a miniature railway! The completeness of Hornby equipment makes it possible to follow closely the formation and running operations of real practice. "*Pullman Race Special*" trains are operated frequently on the S.R. and on the L.N.E.R. in connection with the most important meetings. Their running in miniature would be a novelty, while the making of the arrangements necessary for including specials of this kind among the regular trains is always fascinating.

When assembling such trains as these with Hornby No. 2 Special Pullmans, care should be taken to see that the Composite vehicles are marshalled at the ends. The guard's and luggage accommodation provided by them will then be situated in the correct position, and the trains will have the neat and well-finished appearance that characterises the all-Pullman expresses of real practice.

In addition to the various trains that are composed exclusively of Pullmans, there are many others made up of railway companies' stock that also include Pullman accommodation to the extent of one or two cars. The contrast in colours is then very striking, the umber and cream Pullman livery showing up well against the L.N.E.R. teak brown, or the S.R. green, as the case may be. The L.N.E.R. Continental services that operate between Liverpool Street and Parkeston Quay convey Pullmans in trains otherwise composed of standard stock. In miniature the Hornby No. 2 Saloon Coaches and No. 2 and No. 2 Special Pullmans can be used to reproduce such formations, and an interesting point is that these different vehicles can be correctly vestibuled together by means of the Corridor Connection with which they are provided. This helps to maintain the atmosphere of importance that always surrounds a Continental Boat Express, even in miniature.

The No. 2 Saloon Coaches are in fact extremely useful vehicles for a number of different purposes. They can be used for restaurant or sleeping cars, and they represent very well the end-vestibule corridor type of vehicle that is so popular nowadays for main line travel. Centre corridor vehicles are largely used for excursions, and the No. 2 Saloon Coach is typical of many vehicles of this kind that are found in actual practice. The organisation of special excursion working is always interesting and during the Winter there are many long-distance football and other excursions that can be run on Hornby Railways. For the formation of such trains the No. 2 Saloon Coach is ideal.

Coming now to non-corridor stock, the best vehicles of this type in the Hornby Series are the No. 2 Coaches. These represent the familiar compartment type of coach, and can be employed for almost every kind of ordinary passenger train, including long distance residential and business services. On layouts where there is plenty of accommodation, and a corresponding amount of stock, No. 2 Coaches can form the ordinary suburban and local trains. The No. 2 Coaches are made as First-Thirds or as Brake-Thirds, so that the complete trains can be correctly assembled.

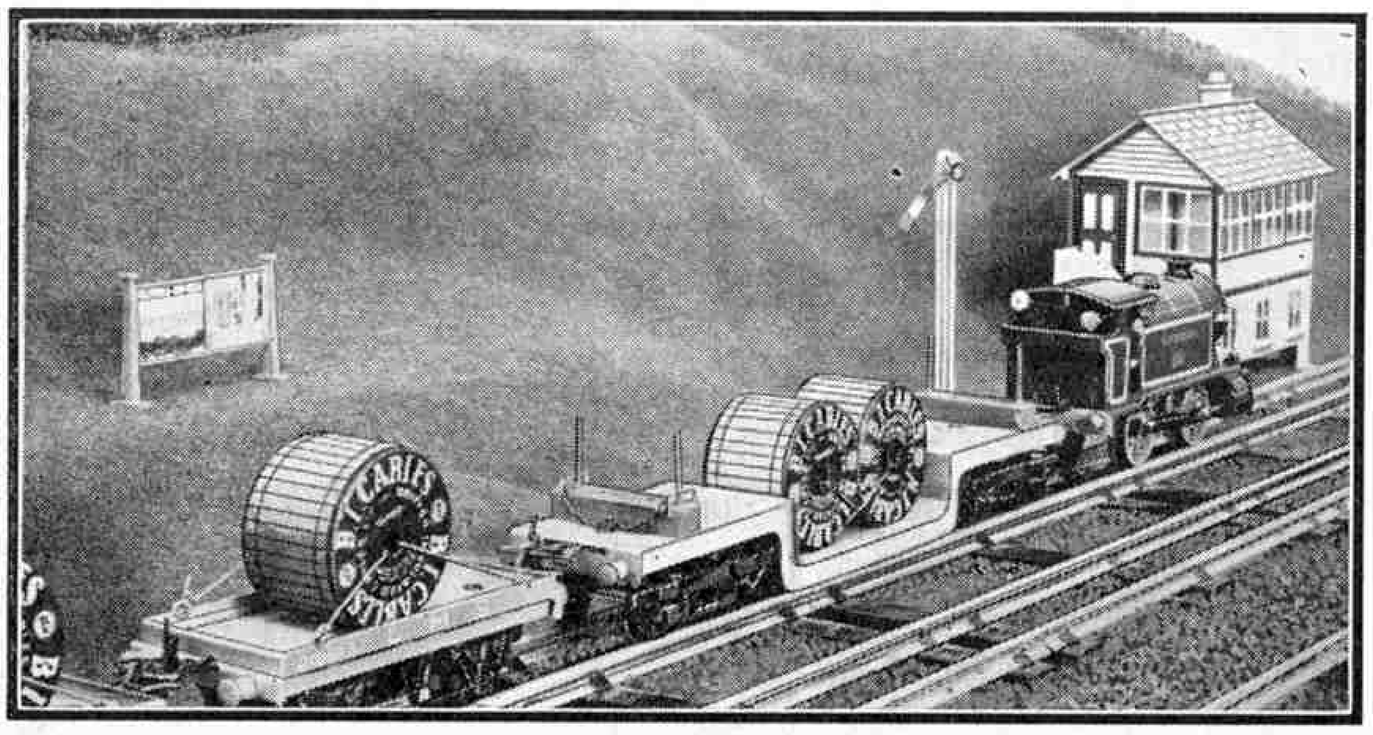
A feature of interest that should not be neglected is the placing of a tail lamp on rear vehicles of a train of these No. 2 Coaches. These and the No. 1 Coaches are fitted with lamp brackets for the purpose, and are supplied with appropriate tail lamps. The presence of the tail lamp shows that the train is complete, and it has to be looked out for by the real signalmen as the trains pass them. It is important therefore on a Hornby Railway to see that the tail lamp is in position before the train leaves the carriage sidings.

Cable Drum Transport in Miniature

By "Tommy Dodd"

THE miniature Cable Drum introduced into the Hornby Series some time ago is an extremely popular accessory. Its prototype, which will be familiar to all readers, takes the form of a large wooden "reel" on which is wound cable used for the distribution of electricity. When this "reel" is filled with coils of cable, boards are fixed across the edges and form a drum. The cable is thus completely covered in and is protected from any damage in transit. With the ever-increasing use of electricity these cable drums have become familiar items of freight on our railways.

The Hornby Cable Drum is a most effective accessory and is finished in a realistic manner to represent the drums used for the transport of the cables manufactured by the well-known firm British Insulated Cables Ltd. Both sides of the Hornby Drum bear the inscription "B.I. Cables" in large letters arranged to cover practically half the circumference of the side, so that there is room for the words to appear twice. Separating the two inscriptions round each side there are two "B.I." trade marks, and within the ring thus formed the full name of the firm appears, thus forming practically a full inner circle. These details are common to both sides, but on one side of each drum there appears a very necessary instruction "*Roll drum this way*," the direction being indicated by an arrow. This ensures that the drum is placed the right way round for the laying of the cable. Round the actual edge of the Hornby Cable Drums the boards used to cover in the cable are shown in a realistic manner.



A train conveying Cable Drums on a Hornby Railway. These are shown loaded on a Flat Truck, and also on a Trolley Wagon, which has die-cast wheels and axle-boxes, as described in this article.

As might be expected these Cable Drums make quite an imposing load on the Flat Trucks that are provided for their transport. The Flat Truck is an interesting piece of rolling stock, typical of the low-sided goods wagons that are in common use on all our railways. It is therefore available finished and lettered to represent each of the four groups. It conforms generally to the usual standards of Hornby Goods Rolling Stock and is of course fitted with automatic couplings. A feature that is of special importance in connection with securing loads such as Cable Drums is the provision of four wire rings, two to each side, to which miniature ropes or chains can be attached. These fittings correspond to the ring plates that are found on real wagons for the same purpose.

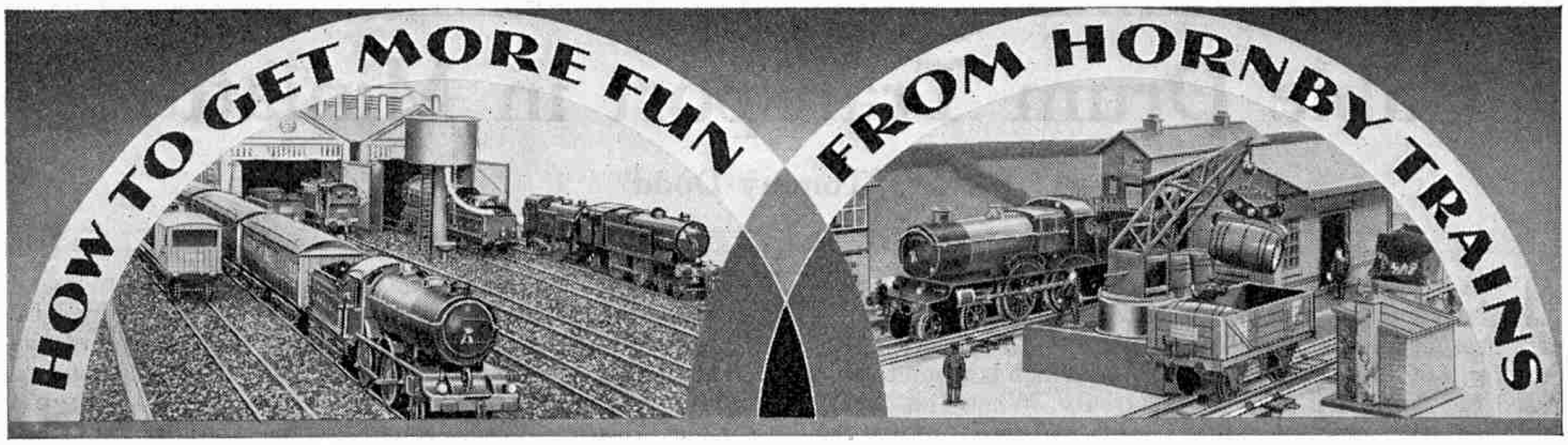
The method of securing the Hornby Cable Drum is shown in the accompanying illustration, and is the same as that followed in actual practice, "ropes" of Meccano Cord being passed from the rings on one side to those on the other side of the vehicle through the hollow centre of the Drum. This results in the firm fixing of the load, although additional security is obtained by the use of scotches or wedges nailed to the floor of the real wagons to prevent any tendency of the drums to commence rolling.

The Hornby Cable Drums make suitable loads on any layout and they are particularly applicable to electric systems. Many miles of cable are required for real electrification schemes, so that the number of cable drums involved reaches quite high figures. Laying the cable alongside the track is an interesting process and is carried out by means of a "cable-laying" train. This consists of wagons on which special supports or frames are fixed that allow the cable drums to be revolved. The train moves slowly along and the cable is paid out from the wagons to the lineside, where it is housed in the special troughing prepared for it. This is usually of wood above ground, or of concrete where it is necessary to bury the cables.

For such bulky loads as large cable drums it is often necessary to employ special low-built machinery trucks, or trolley wagons. Their low construction reduces to a minimum the amount of lifting when loading and unloading, which is a point of importance. Special interest is therefore attached to the Hornby Trolley Wagon that is now available loaded with two of the standard Hornby Cable Drums. The Cable Drums are accommodated in the well portion of the Trolley Wagon, and they are secured by miniature "ropes" passing through the centre of the Drums and through the slots that are provided in the well for this purpose. Loaded thus the two Cable Drums present an imposing appearance and add considerably to the realism of any freight train to which the Trolley Wagon is attached. A train load of Cable Drums on Flat Trucks or Trolley Wagons could be run if required.

The Trolley Wagon itself, which is a familiar vehicle to all Hornby Railway owners, has been improved in an important detail for this season. The bogies are now provided with axle-boxes and in place of the tinplate wheels formerly used die-cast spoked wagon wheels are substituted. These greatly improve the realistic appearance of the vehicle and in addition the ease and smoothness of its running.

Similar improvements are also being made to other items and Hornby No. 2 Rolling Stock. These are the Breakdown Van and Crane, and the No. 2 Pullman and Saloon Coaches. The passenger vehicles are provided with Mansell pattern solid wheels.

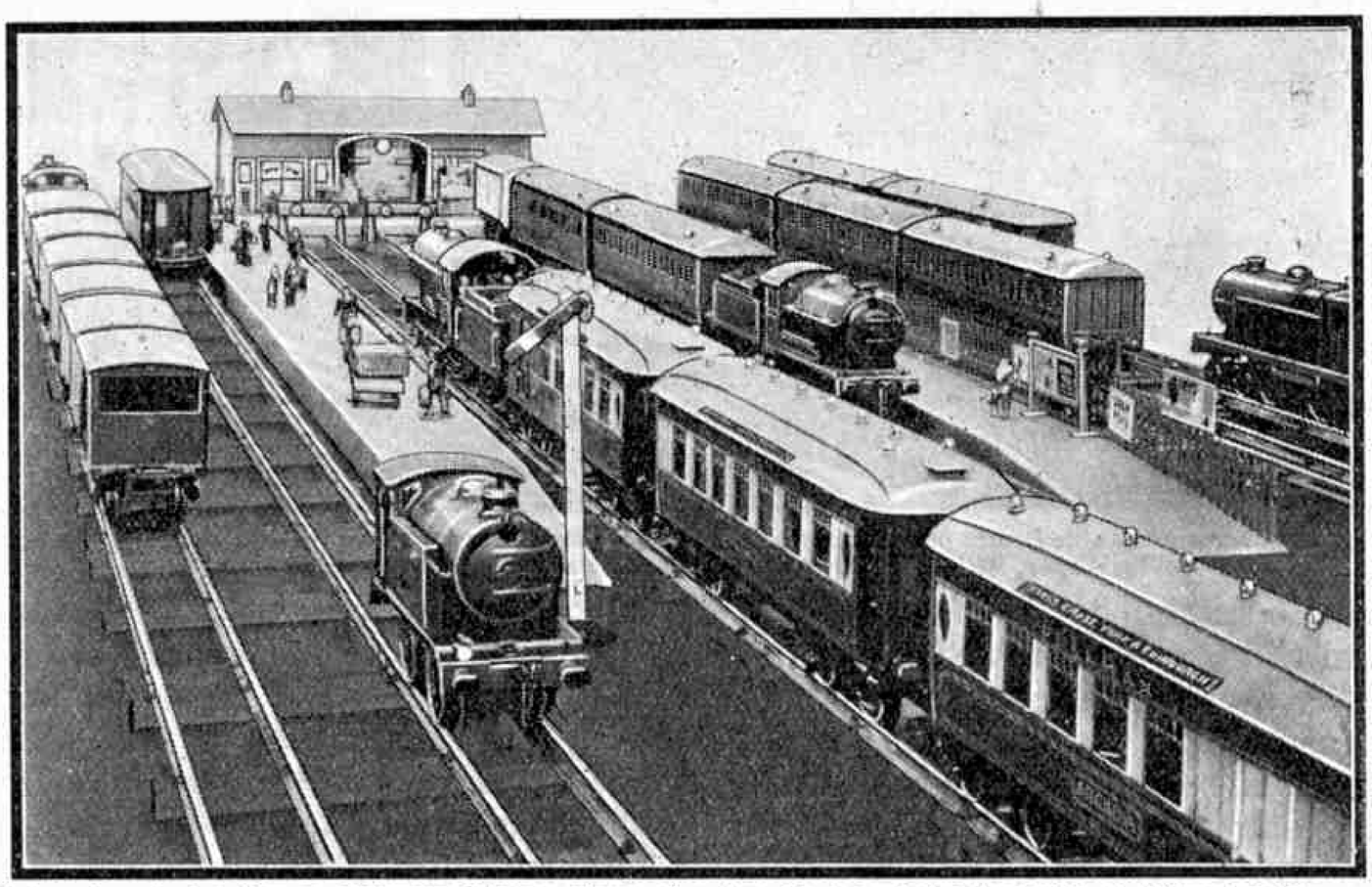


STATION WORKING ON HORNBY RAILWAYS

A LARGE proportion of the queries received from readers that are dealt with at H.R.C. Headquarters refer to the planning of layouts, their signalling and the train operations that are possible on them. Many of these queries are concerned with stations, particularly terminal stations. These are necessary in any layout, for without them trains would have nowhere to leave or at which to arrive, and their running would have no object. They are of special interest in planning a miniature railway, for it is not always easy to decide on a layout, especially if space is limited. This month therefore we are describing a station layout that was devised to meet the special requirements of a member of the H.R.C. because it has many features that make it of interest to all miniature railway enthusiasts, and in this article it is proposed to deal with some of the operations that can be carried out on it.

This station layout is illustrated at the top of the opposite page. It consists of three main platforms, the centre one being an island, and there is available a total of four platform faces. Arrival and departure platforms are not kept separate, the platforms being used as convenient according to the demands of traffic. This reduces the amount of shunting necessary with empty trains, and is a method that is necessarily adopted on many miniature systems. The rails between each pair of platform faces consist of Hornby Double Track. The inner end of the platforms beyond the extreme right-hand edge of the illustration the rails terminate in Hornby No. 2 Buffer Stops, which reproduce so well the chief features of the hydraulic buffer stops found in real termini. At the outer ends of the platforms the rails of each length of Double Track converge by means of Hornby Parallel Points. A connection is then thrown off each of the two single tracks thus formed towards the centre of the layout by means of ordinary Points, the curved branches of these Points joining up to the corresponding arms of a pair of Double Symmetrical Points. Thus both lead to the No. 2 Turntable shown, and this in turn gives access to an Engine Shed by means of Parallel Points. The double track engine roads continue for one or two rail lengths beyond the shed and terminate in buffer stops.

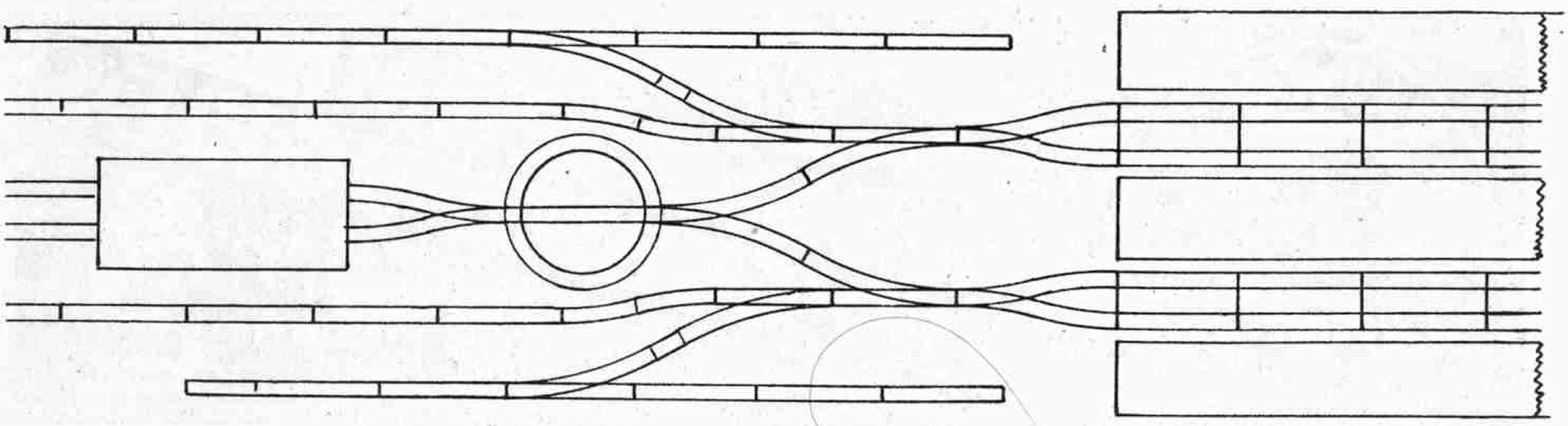
The effect of this arrangement is that the locomotive accommodation is centrally situated, with ready means of access to the station and to the sidings outside it. The main lines pass on each side of the turntable and shed roads, and each incorporates a slight reverse curve formed of two Curved Half Rails in order to clear the turntable. Beyond the limits of the diagram on the left-hand side these lines are again brought nearer together by means of similar reverse curves. Full length Curved Rails then bring them nearer together, and they are resolved into single track by means of Double Symmetrical Points. These are applied in the same manner as those leading to the locomotive shed that we have already considered.



A busy terminal station on a Hornby Railway. Trains of various kinds are being dealt with at different platforms, and an all-Pullman express is seen arriving.

Main lines consisting partly or wholly of single track are not uncommon on miniature railways. In this case the arrangement of track connections gives trains on the single main line access to any of the station platform lines by means of the approach roads. With the methods of working adopted, this results in the rapid handling of traffic, both in and out. Trains therefore habitually travel in either direction over the tracks connecting the platform lines with the single track main line section. Such "reversible" working is not unknown in real practice in the neighbourhood of busy terminals. Considerable lengths of track are sometimes arranged for it, the flow of traffic at busy periods settling whether such lines are to be used for up and the down traffic for any particular period, but of course special attention has to be given to signalling.

If the miniature terminus is required to handle in quick succession a series of arriving trains constituting "business rush" traffic, these could proceed from the single main line along either of the tracks alongside the Engine Shed as convenient. We will consider the movements during a typical "peak period" and assume that the first train enters the terminus by means of the approach line above the



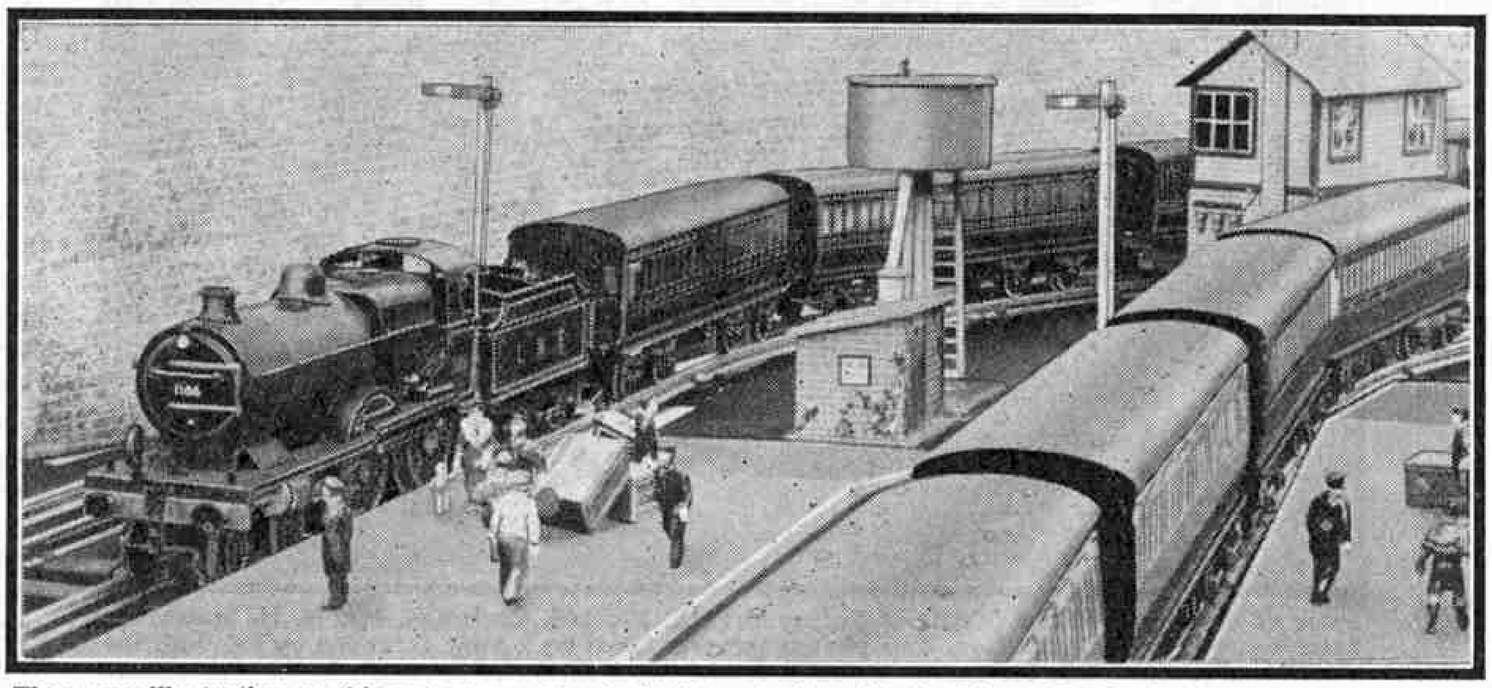
engine sheds in the diagram. It comes to rest alongside the upper single-faced platform at what we will term for convenience the north side of the station. The engine is uncoupled, but as its coaches are required for an outgoing service and running round facilities are not provided owing to the limits of space, another locomotive proceeds from the engine yard and is attached to what now becomes the head of the train. This move is carried out immediately in the interval between the arrival of this train and the next, which follows the same path, but is turned into the platform road adjacent to the northern face of the central island platform.

Almost at the same time similar operations have been going on in the south side of the station, so that we have the arrival of four trains at quite short headways. Possibly departures have to be effected equally rapidly, so that the first arrival with the fresh locomotive at its head leaves the north platform. This movement releases the engine that brought this train in. This engine follows the outgoing train until just clear of the Parallel Points beyond the platform end. These Points are changed, the engine is reversed and then backs on to the second arrival at the upper or northern face of the central island platform. The engine that brought this in has been uncoupled and on the departure of the train it is switched into the locomotive yard. From there it proceeds in turn to back on to one or other of the trains in the south side of the station. A similar cycle of operations to those we have just followed is repeated, the last move being the release of the fourth arriving engine on the departure of its train. This engine runs out into the locomotive yard and waits there until the arrival of a further train, when another spell of duty commences.

This method of operation is known as turnover working, and engines so employed are known as turnover locomotives. It is necessarily adopted when running round facilities for engines are not provided at a terminus; running round invariably requires Crossover Points and in terminal layouts it is often difficult to find room for them. They require in addition an engine length or so of track between them and the buffer stops, to allow the engine to draw forward from its train clear of the Points before reversing to the other end of the station.

At other less busy periods an arriving train perhaps may not be required for a departure until later on, so the engine backs it out of the station into one or other of the sidings according to the platform at which the train arrived. At the end of the siding a locomotive can be waiting, having previously proceeded there from the Shed or after release from the station on the departure of a train brought in previously. This locomotive is coupled to the shunted train which is thus ready to be backed from the siding into the station when required for a departure.

Workings of this kind with variations, can be indulged in to almost any extent, the planning of different movements being very fascinating. The layout also could be altered without difficulty to suit other conditions. For instance, the dead-end sidings at the extreme edges of the layout could be prolonged into running loops. These would be useful in affording separate roads for the up and the down traffic, and in addition might be used to separate different classes of traffic, then becoming relief lines more particularly intended for parcels, milk, and other similar freight trains that would be dealt with at the terminus. On a layout worked entirely by tank engines the turntable in the locomotive yard would not be really necessary. It was provided in this instance as tender and tank locomotives were in use together.



The upper illustration on this page shows the station layout referred to in this article. In the lower photograph train working is shown in progress at a station, with a stopping main line train arriving.

Effective terminal stations can be arranged with the aid of Hornby components. The standard lengths of Passenger Platform are very useful, whether they are employed with the Paled Fencing supplied with them as an ordinary platform, or without it as an island. In the illustration on the previous page both uses of the Passenger Platform sections are shown. They also can be laid end to end to make a long platform, and are then secured together by means of the special locking device at each end. This device also is provided on the platforms of the No. 2 Station, on the ramps, and on the Island Platform. In addition, the front edge of the No. 2 Station platform has these fittings, so that lengths of Passenger Platform can be attached at right-angles to it. This enables the Hornby Railway owner to assemble a terminal station without difficulty, the centre of the No. 2 Station forming the circulating area.

Branch News

PLYMOUTH.—The annual general meeting of the Branch has been held and the Branch Committee and Officials for the current year's work have been elected. Several track meetings have been enjoyed and each member has taken a fair share in the various operations. Recent outdoor activities have included visits to the S.R. Friary Locomotive Sheds at Plymouth, where members were allowed to inspect various locomotives at close quarters, and to climb on to their footplates. On an outing to Yelverton part of the track of the old Plymouth and Dartmoor Railway was explored. The Branch recently celebrated its birthday with a special concert. Future arrangements include the Annual Exhibition in December and in the same month a railway Lantern Lecture. Secretary: R. Symons, 47, Sisson Grove, Mutley, Plymouth.

COTTESMORE.—During the Summer members who were in camp at Cromford made a special study of the Cromford and High Peak line, and also of the traffic over the main line of the Midland Division of the L.M.S.R. that passes through Cromford station. Good progress has been made by the Branch and a very full programme for the Winter Session has been arranged. This will include regular Track Meetings, Socials and Special Cinema and Lantern Slide Displays. Visits are to be paid to places of interest, and one that is eagerly anticipated is that to the Meccano Factory. A Study Circle for the reading of the "*M.M.*" and railway and engineering books has been instituted. Secretary: J. S. Butler, Cottesmore Central School, Lenton, Nottingham.

ELMSIDE (EXETER).—The relaid track is proving a great success and improved working has resulted from the incorporation of additional sidings and connecting lines. The relaying of tracks is carried out as in actual practice, without suspending the train services. Modified workings are adopted to suit the special conditions, and this adds considerably to the realism of operations. Secretary: T. Smith, 98, Ladysmith Road, Exeter.

WHITGIFT SCHOOL.—A recent visit that was greatly enjoyed was paid to the Signal Box at London Bridge (S.R.). Members were shown over the Box and were greatly interested to watch the progress of various trains on the large electrical indicator. After observing the working of the trains, the locking arrangements and power plant were inspected. The day was completed by a visit to the Science Museum, South Kensington. Train running to timetable has been a feature of recent track meetings, and Winter session activities are now in full swing. Secretary: J. C. Watson, 23, Addiscombe Avenue, Croydon, Surrey.

FOLKESTONE.—An increase in membership is recorded and a good start has been made with the Winter service on the Branch track. "Folkestone Harbour" station is now complete and a new station representing "Folkestone Junction" is under construction. "Margate" and "Brighton" stations are to be improved. It is possible that new services will be introduced representing the Dover Train Ferry workings of real practice. New signals are under construction and most of the existing ones have been repainted. Various track improvements are to be made that will be a considerable aid to high-speed running. New telegraph poles are being installed, and water storage tanks are being provided at all stations. Secretary: F. E. Saunders, 79, Dover Road, Folkestone, Kent.

SWAN (KIDDERMINSTER).—Stations made of wood have been added to the Branch layout, and at one of these colour-light signals have been installed experimentally. Through the generosity of a local gentleman who is interested in the Branch, a specially painted scenic background 18 in. high has been provided all round the track. Trains are operated to represent G.W.R. services, and as the result of experience one or two modifications to the track plan have been effected. At some meetings games are played, and a Branch Library has been formed. Secretary: A. Hamblin, Black Bull Hotel, Swan Street, Kidderminster.

WATERLOO (DUBLIN).—The attendance of meetings continues to be satisfactory, and for the present the usual arrangements are being followed. The Branch layout has been overhauled and cleaned up, and the Branch room generally prepared for the intensive activities of the Winter Session. For the accommodation of the various tools belonging to the Branch the "shadow board" system as employed in actual practice, has been adopted with success. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

Some of the members and friends of Sydney Branch, No. 146. Chairman, Mr. H. H. Matthews; Secretary, Mr. W. J. T. Watson. This photograph was taken on a joint excursion by rail with the associated Meccano club. On these occasions a special coach decorated internally in the club colours and with the club badge prominently displayed on the outside is always used.

AUSTRALIA

PARRAMATTA.—The proposed electrification of the Branch layout has now been carried out. The Hornby 20-volt system has been adopted and the Locomotives have proved so powerful that additional rolling stock is to be obtained. A Visit has been paid to the Branch layout by the members of the Sydney Branch. The Branch extends an invitation to visit the layout to any "*M.M.*" readers who care to do so. The Branch room is open for this purpose every evening and on Saturday afternoons, and appointments should be made by writing to the Branch Secretary. Future arrangements include the provision of additional siding accommodation and improved facilities for handling goods traffic, and the installation of colour-light signals, and the electro-mechanical locking of points. Lineside effects are to be the subject of special attention. Secretary: H. H. Matthews, 27, Ross Street, Parramatta, N.S.W., Australia.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below.

ABERDEEN—J. Geddes, 26, Argyll Place.
GREENOCK—J. Agnew, 122, Dunlop Street.
SOUTHAMPTON—N. Guilmant, 69, Shirley Park Road, Shirley.
SUNBURY—J. S. Mathieson, 5, Kempton Avenue, Staines Road.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

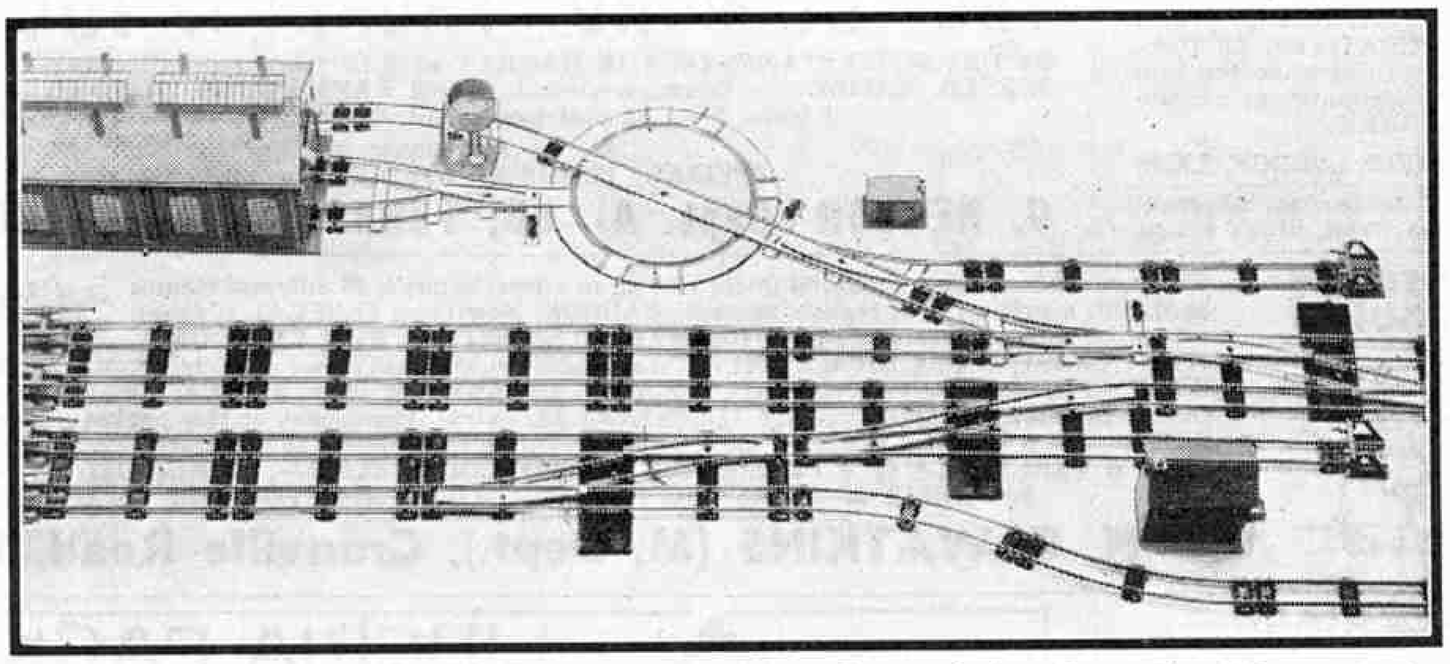
H.R.C. COMPETITION PAGE

PLANNING A HORNBY RAILWAY

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

The central feature of any Hornby railway is of course the layout of the track. This must be so designed that interesting and realistic working can be carried out on it, and only when this is the case can the owner of a miniature railway derive the full pleasure and enjoyment that comes from adding accessories and scenery.

This month we give H.R.C. members an opportunity of showing their skill and ingenuity in planning a Hornby layout with this purpose in view. The space that is supposed to be set apart for this purpose measures 15ft. by 10ft. There are no fireplaces or other obstacles to contend with, and in order to give competitors free scope for designing a really useful and interesting Hornby railway no restrictions are imposed in regard to cost. At the same time it must be remembered that a carefully planned layout in which every component serves a definitely useful purpose is more likely to be successful than one that is merely crowded with tracks, points and crossings.



Competitors may introduce as many features as they wish. A good terminal station is almost a necessity, and a well-planned arrangement of such a station is shown in the accompanying illustration. This is reproduced as a guide to show the features that must be kept in mind in station designs; but of course it must not be copied. Only 2 ft. radius track should be used on curves, and no signals need be indicated.

The drawings submitted should not only indicate track arrangements, but should show also the positions of station buildings, engine sheds, bridges, crossings and other important features. Boys who are poor at drawing need have no hesitation about entering this Contest; entries will be judged strictly on the layouts and not on the quality of the drawings.

The Contest is divided as usual into two sections, Home and Overseas, and the senders of the three best layouts in each will be awarded prizes consisting of any products manufactured by Meccano Ltd., to the respective values of 21/–, 15/– and 10/6. In the case of a tie for any prize, the prize money will be equally divided. A number of consolation prizes also will be awarded.

Envelopes containing entries must be marked *"H.R.C. November Layout Planning Contest"* in the top left-hand corner, and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th November. The closing date in the Overseas Section is 27th February, 1937.

Word-Building Contest

The two Word-Building contests held during 1935 were very popular with H.R.C. members, and for our second contest this month we are arranging a third of this type. The requirements are very simple, all that competitors are asked to do being to make as many different words as they can, using the letters that appear in *"Hornby Electric Trains."*

Only standard English words are admissible in this contest, and proper names, and faked or slang words are not allowed. Entries should be written on one side of the paper only, and the total number of words submitted must be stated at the end of the list.

The contest will be divided into the usual two sections, Home and Overseas. To the three competitors in each section who submit the longest list of words will be awarded prizes consisting of any products of Meccano Ltd. to the respective values of 21/–, 15/– and 10/6. In addition a number of consolation prizes will be awarded.

Envelopes containing entries must be marked *"H.R.C. November Word-Building Contest"* in the top left-hand corner, and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th November. The closing date for competitors in the Overseas Section is 27th February, 1937.

COMPETITION SOLUTION

"July Errors Contest"

This contest produced a remarkably large number of entries, and competitors showed great keenness in hunting for the errors introduced by our artist into his illustration. Some entrants in fact were too sharp-sighted, for they spoiled their efforts by discovering errors that did not exist.

Unfortunately space does not permit us to give a complete list of the errors. The largest number was found by K. Costain, of Bolton, who detected 43 genuine mistakes, and his entry was awarded first prize. Second prize was won by J. N. Leedam, of Burnley, who found 41 errors, and the third prize was awarded to J. T. Fraser, of Exeter, whose entry indicated 39 mistakes.

COMPETITION RESULTS

HOME

September "Voting Contest." First: G. MASTERSON (47859), Leytonstone, London, E.11. Second: D. JAMES (39923), Northenden, Manchester. Third: H. WILSON, Leek, Staffs. Consolation Prizes: J. C. BUTTON (10335), Crewe, Ches.; J. C. BAKER (36514), Ryde, I.O.W.; J. WEST (46770), Hipperholme, Nr. Halifax.

"Summer Puzzle Contest." In view of the fact that several competitors submitted all-correct solutions in this contest, the judges have decided to divide the First Prize of £1/1- between the two competitors whose entries were most complete and presented in the neatest and most eligible manner. Special Consolation Prizes have been awarded to the remaining competitors whose entries were correct, but not quite up to the standard of the two winners in regard to presentation. First Prize: divided between L. T. A. BERN (347), Portsmouth and J. F. TAYLOR (42922), Beckenham, Kent. Consolation Prizes: P. T. JACKSON (46596), Hornsey, London, N.8; J. C. BUTTON (10335), Crewe, Ches.; F. J. HEARN (33614), Southgate, London, N.14; V. H. CUTTS (624), St. Albans; P. L. BALDWIN (32479), New Malden, Surrey; J. E. ALLEN (31359), Leytonstone, London, E.11; C. E. WRAYFORD (6039), Moretonhampstead, Devon; A. M. ADAM (44544), London, N.6; S. EVANS (21924), Bosham, Sussex; W. H. COOK (2249), Kensal Rise, Willesden, London, N.W.10.

September "Railway Photo Contest." First: D. F. FORBES (14092), Leith, Edinburgh 6. Second: D. FEAR (18477), Taunton. Third: C. SPENCER (44179), Sheffield 6. Consolation Prizes: J. W. HAGUE (1258), Ripon; T. G. COOK (43441), Shirley, Croydon; G. L. WILSON (2478), Wormit-on-Tay, Fife; H. S. G. DARKE (4461), Hampstead Garden Suburb, London, N.W.11; H. C. M. CLEMENTS (31981), Tunbridge Wells.

SETS (POSTAGE EXTRA)

10	Australia ...	2d.	5	Fiji Is. ...	3d.
1	,, Jubilee	1d.	1	,, Jubilee	4d.
5	Barbados ...	2d.	5	Gold Coast ...	3d.
1	,, Jubilee	4d.	10	,, ,, ...	6d.
4	Bermuda ...	3d.	1	,, Jubilee	2d.
1	,, Jubilee	4d.	3	Grenada ...	2d.
5	Brit. Guiana ...	3d.	1	,, Jubilee	2d.
1	,, Jubilee	2d.	5	Hong Kong ...	2d.
10	Canada ...	2d.	10	,, ,, ...	5d.
3	,, Jubilee	4d.	1	,, Jubilee	3d.
4	Cayman Is. ...	6d.	20	India	6d.
1	,, Jubilee	3d.	4	,, Jubilee	6d.
10	Ceylon ...	2d.	5	Jamaica ...	2d.
1	,, Jubilee	2d.	10	,, ...	5d.
5	Cyprus... ...	3d.	1	,, Jubilee	2d.
10	,, ...	6d.	5	Kenya	3d.
1	,, Jubilee	3d.	1	,, Jubilee	3d.

J. RUSSELL
23, Shanklin Drive, Westcliff-on-Sea

ABYSSINIA

A timely offer, which should not be missed, of a superb **MINT** set of 30 diff. stamps from this mysterious country, mostly 1917-31 issues (cat. over £1), with scarce **AIR STAMPS, COMMEMORATIVES, PICTORIALS, ETC.** Price 5/- only, secure them while you can. We offer superb collections of any country at bargain prices. Full lists FREE.

NORRIS & CO. (Dept.M), NORWOOD, LONDON, S.E.19

500 STAMP MOUNTS FREE to bargain approval applicants.—Winter, 89, Cobham Road, Seven Kings.

THE "QUEER COUNTRY" PACKET FREE!

Have you got stamps from Trans-Caucasia, Georgia, Azerbaijan, Iran in your collection? There is a stamp from each of these queer, outlandish places in this excellent packet of 35 different stamps. They are good stamps, too. For instance, the Trans-Caucasian is catalogued at least 1/6. There are also sets from Bohemia, Kenya Colony, Magyar, South Americans, Manchukuo, Holland (Jubilee), Persia (Lion of Judah), British Colonials, including the famous "Mountie" stamp of Canada. Set of Denmark, including King Christian and Coravel, Norway (Spitzbergen). Finally a beautiful Mongolian stamp and Jugoslavia (new Boy King) ABSOLUTELY FREE. Just send 2d. for postage, requesting approvals. We also send new Price List free.

LISBURN & TOWNSEND LTD. (Dept. M.M.), LIVERPOOL 3

Stamp Collections purchased for prompt cash.

FREE WONDERFUL 1936 OFFER 25 NEW ISSUES AND NOVELTIES

Including **Andorra** (1935), fine new **Cayman Islands** (map of Islands), obsolete Austria, China, Denmark, **Gwalior** Service, Hungary (Statesman Szechenyi), **new Kenya** (Kavirondo Cranes), **Roumania** (new portrait of King Carol), and many others. I will send this collection **absolutely free** to all stamp collectors sending 2d. postage (abroad 4d.).

G. P. KEEF, Willingdon, EASTBOURNE

THE "DIAMOND" PACKET IS THE ONLY PACKET

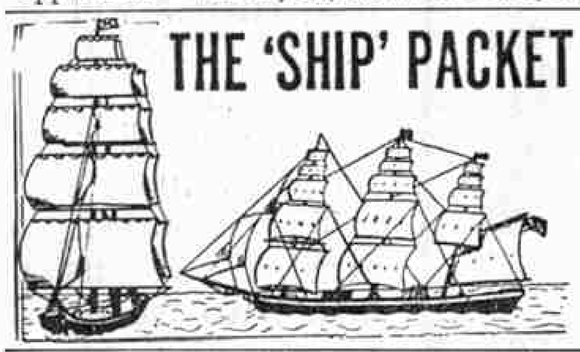
OF UNSORTED STAMPS ON THE MARKET with 15 years' reputation behind it. It contains approx. **1,000 UNSORTED STAMPS** from Convents abroad. **MANY RARE STAMPS** have been found in it. 1 pkt., 1/6; 3 pkts., 3/9; 5 pkts., 6/-. All post free inland. Colonies 3d. per pkt. extra. Foreign, 6d. extra.

Ask your stationer for the "Diamond" packet.

SPECIAL: TURKS IS. JUBILEES complete set, used or unused, 5/6.

O. NERUSH (Dept. A), 68, TURNPIKE LANE, HORNSEY, LONDON, N.8

THE 'SHIP' PACKET



This marvellous packet is offered under cost as an advertisement, **45 different stamps each with a ship on it.** A regular armada. **GABOON,** New Issue **SENEGAL** (Canoe), wonderful flotilla of caravels from **DENMARK** (complete set). **NEW CALEDONIA, IVORY COAST, COSTA RICA,** a fleet of **7 CHINESE** junks usually sold at 10d., **TRINIDAD & TOBAGO, MAURITIUS, SOUTH WEST AFRICA, NEWFOUNDLAND, U.S.A., B. GUIANA,** set of **S. AFRICA, GREECE, POLAND, INDO-CHINA, FRENCH OCEANIA,** etc. Price 4½d., postage 1½d. (abroad 3d. extra). Purchasers of this packet asking for approvals receive **FREE** set of **3 SPAIN** (Columbus, each with his ship on it). Senders of addresses of stamp collectors receive **FREE** set of **6 VENEZUELA** or **6 PERSIA, 100 BRITISH COLONIALS 1/-, 20 AIRPOST 6d., 6 TRIANGULARS 6d., 50 PERSIA 4/-, 2 ASTRID** (mourning stamps) 2½d., **VOLUMES OF B.O.P. CHEAP.**

H. C. WATKINS (M. Dept.), Granville Road, BARNET

NOVEMBER SPECIALS

2	Afghanistan ...	2d.	6	Manchukuo ...	3d.
1	Aitutaki ...	2d.	2	Morvi	2d.
3	Bahamas ...	3d.	4	Negri Sembilan, mint	6d.
2	Bahrain ...	2d.	6	New Guinea ...	9d.
4	Barbados ...	3d.	1	N.Z. Air, used ...	2d.
2	Barwani ...	2d.	3	N.Z. Air, 1d., 3d., 6d. mint ...	1/3
3	Basutoland ...	4d.	4	Pahang, mint ...	6d.
4	Bechuanaland ...	5d.	4	Papua Ann., cpte	1/3
4	Queen Astrid ...	10d.	4	Perak, mint ...	6d.
3	Belgian Olympic Games... ...	9d.	5	Port Said ...	4d.
6	Belgian Congo ...	3d.	12	Porto Rico ...	7d.
5	Bijawar ...	10d.	2	Raratonga ...	4d.
3	Bolivia	2d.	7	San Marino ...	5d.
5	British Honduras	6d.	1	Saxony	2d.
2	British Somali ...	3d.	4	Selangor mint ...	6d.
2	Brunei	2d.	9	Soloman Ids., ½d. to 1/- mint ...	3/6
2	Cape Juby ...	1d.	5	Spanish Morocco	3d.
5	Cayman Islands	4d.	5	Szechuan ...	3d.
3	Chili Airmails ...	3d.	5	Timor	3d.
3	China, Postage Due	2d.	3	Tonga	4d.
3	Chinese Turkestan	2d.	7	Transjordan ...	8d.
3	French Levant	2d.	5	Vatican	4d.
5	Hejaz-Nejd ...	6d.			

15 Different Mozambique Company, **AIR ONLY,** Price 1/10.

All Orders Postage Extra.

A BONUS of 25 best quality sorting envelopes will be given free to purchasers of not less than 2/6 worth, and a BONUS of 50 ditto., a good assortment of sizes, will be presented to all purchasers of not less than 5/- worth from this advertisement.

EDWARD SANDELL, 10, Evelyn Grove, Southall, Mx.

Business by Post. No Callers.

The NEW "TRANSPORT" Packet

Contains a wonderful assortment of 44 foreign and colonial stamps including the following which depict various means of transportation, **Tunis** (water carrier), **Senegal** (bridge and boats), **Mauritania** (crossing desert), **Mid. Congo** (train and bridge), **Sth. Africa** (ship), **Germany** (aeroplane), **Austria** (horseman), **Indo China** (boat), **Mozambique** (aeroplane), **Gaboon** (raft), **Greece** (bridge and liner), **St. Pierre and M.** (trawler), **Fr. Guinea** (native carriers), **Dutch Indies** (Steamboat), **Madagascar** (native transport), **Brazil** (aeroplane), **Belgium** (train), **Roumania** (aeroplane), **Newfoundland** (steamship), **Fr. Morocco** (camels). Price **6d.** All purchasers asking for approvals will receive large **Ceylon** pictorials free.

BURDOCK & FLURY,
4, MARLBOROUGH ROAD, LONDON, S.W.19.

LIBERIA PACKET FREE!!

This packet contains a fine mint **TRIANGULAR LIBERIA** (cat. 1/6); set of the attractive **DENMARK** Hans Andersen commemoratives; mint stamps from **PARAGUAY, MOZAMBIQUE CO.** (airmail). **GABOON** (surcharged Afrique Equatoriale Française), **PORT. GUINEA** (Ceres), **OCEANIC SETTLEMENTS** (native spearing fish), large **PERSIA**, set of **INDIA** (service), **CEYLON** (King George), **ITALY** (Foundation of Rome), etc. This packet will be sent free **ONLY** to those requesting approvals who send 2d. postage and packing (Overseas 1/-).

HELY. HUTCHINSON (M.2), HURROCK WOOD, KENTS BANK, GRANGE-OVER-SANDS.

BERMUDA PACKET

This packet contains a splendid selection of recent stamps, including many pictorials. **New Bermuda, mint,** as illustrated, 10 cent Canada 1935 (Mounted Policeman), New Zealand 1935 (Kiwi Bird), **Australia 1936 (Telephone),** Hungary, prisoners of War pictorial, Denmark, set of 3 Hans Andersen (Fairy Tales) commemoratives, Nigeria 1935 pictorial, Roumania (King Carol), Ceylon 1935 (Native tapping rubber tree), Siam (double head), Set of 3 China, **Australia (Jubilee),** Set of 10 Canada including the above and **Canada Jubilee.**

The packet for the discriminating collector.

Offered for 4½d. only to genuine applicants for our approval sheets. (Without approvals 9d.) **SHIRLEY STAMP CO., 19, SANDRINGHAM AVENUE, LONDON, S.W.20.**

Tanna Touva Triangular Pictorial Packet—FREE!

Another Globe-Trotter luxury surprise gift **repeated** for one more month—**Tanna Touva** (Northern Mongolia), Picturesque Triangular, **Mozambique Air Mail,** Mint **Tanganyika** Pictorial, **British Guiana** and **Trinidad** Pictorials, large mint pictorials from **Madagascar, Morocco, Martinique, Syria, Andorra, Gaboon,** some lovely stamps from **South America, Belgian Mourning Stamp,** and others—a veritable stamp feast—**FREE.** Send 1½d. stamp postage for Globe-Trotter approval selections, famous for sensational value. Ask for particulars of **FREE** stamps every 14 days! ! Write now—you must not miss the treat in store for you. **First 100 applicants** receive unused set Montenegro (cat. 1/-).

GLOBE-TROTTER, 17, WINCHESTER ROAD, BIRCHFIELD, BIRMINGHAM

Try an "ABBEY" Packet for VALUE!

8 Egypts (with Air), 2 Normandie, 5 Persia, Ceylon (picts.), Aus. Cable, Breton, Le Puy, Cayman, Congo, etc. 25 for 1/- post free.

ABBOTT BROS., 16, Sedgemoor Road, Liverpool 11.

FINEST EVER APPROVALS

Mention the class of stamps you want and get by return the cheapest and best selection ever! Thousands different at ¼d., ½d., and 1d. each; also rare to £1 each. Prices from ⅓rd. to ⅛th Catalogue.

CAMPBELL, HALDON AVENUE, TEIGNMOUTH.

600 BRITISH COLONIALS on approval. Pick at ½d. each.—Sanders, 90, Newlands Avenue, Southampton.

ONE THOUSAND STAMPS ON APPROVAL

From which you may select any 100 for 3/-. This selection is not made up of the very commonest varieties, but contains stamps catalogued at 1/- each or more. (I do not sell less than 100.)

*Special offer of 30 different Scandinavia and Iceland, post free, 7½d. (The Iceland stamps alone are Cat. at least 3/-.)

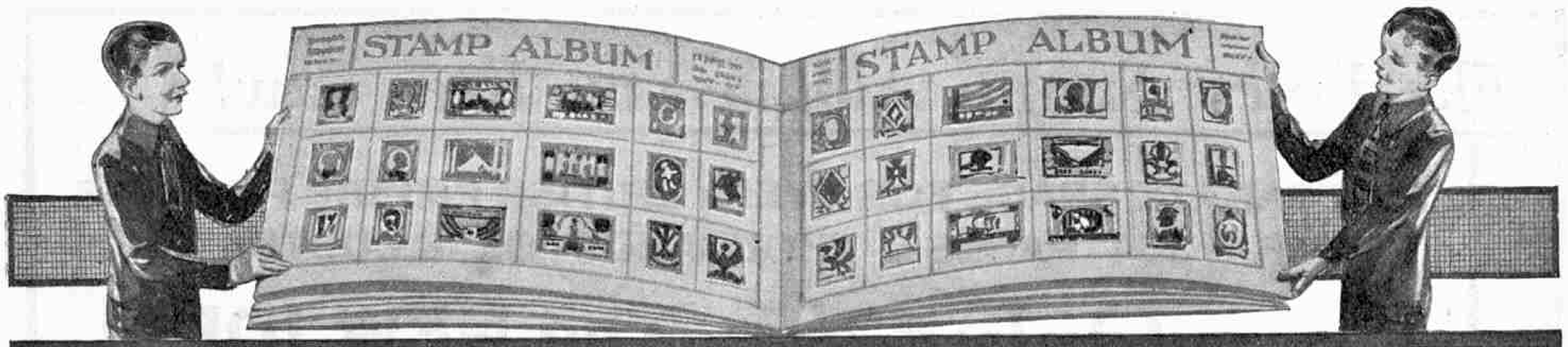
H. HARDY, "Hoyland," Potter Heigham, Norfolk.

100 Different Stamps Free to Approval applicants. Liberal discount.—Cuthbert, Newsham Lane, Broughton, Preston.

ALL BRITISH COLONIAL APPROVALS

Fine **BRITISH COLONIAL PICTORIAL SETS OF CAYMAN ISLANDS and GAMBIA FREE** to all Collectors sending 2d. in stamps and requesting **ALL BRITISH COLONIAL APPROVALS. BRITISH COLONIALS ONLY** on approval at bargain prices, including **JUBILEE** and **NEW PICTORIAL ISSUES,** West Indies, East and West Africa, Cyprus, Iraq, Newfoundland, Papua, and many other fine Colonials. (No stamps sent Abroad.) **C. H. SHAW (Dept. M.11), 95, CHRISTCHURCH AVENUE, KENTON, HARROW.**

For other stamp advertisements see pages 668, 670 and xxxi

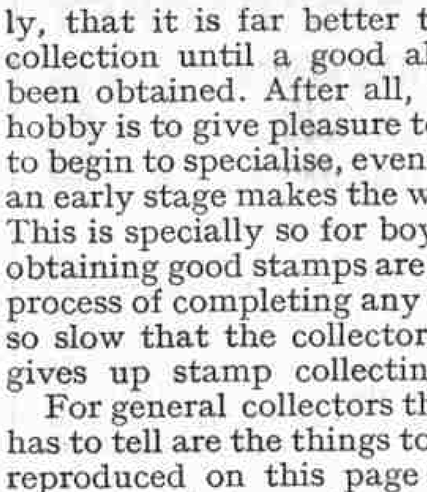


STAMP COLLECTING

BEGINNING STAMP COLLECTING

THIS is the time of year when there are most newcomers in the world of stamp collecting. They usually begin with a small album and a miscellaneous collection of loose stamps, and they set to work to fill in as many of the blanks as possible on the pages of the album devoted to different countries. This is quite good fun at first, but before very long, when the first supply of stamps is exhausted and the process of blank-filling slows down to the rate at which fresh stamps are received from various sources, the young collector begins to be more critical, and to wonder whether he is on the right lines towards making a really good collection. Many beginners who have reached this stage get the idea that they would do better to concentrate on one or two countries, and they write to ask our advice about this. Our reply is always the same, namely, that it is far better to continue with general collection until a good album full of stamps has been obtained. After all, the main purpose of the hobby is to give pleasure to those who follow it; and to begin to specialise, even to a small extent, at such an early stage makes the whole business too serious. This is specially so for boys whose opportunities of obtaining good stamps are limited, because then the process of completing any particular set is apt to be so slow that the collector becomes tired of it and gives up stamp collecting altogether.

For general collectors the stamp itself and the story it has to tell are the things to keep in mind. The six stamps reproduced on this page give some indication of the attractive designs of modern stamps and the wide range of topics they illustrate. The first one is particularly interesting as a reminder of one of the greatest engineering feats ever accomplished. This is the building of Boulder Dam across the Colorado River in the United States, which stores up behind it the flood waters of the river in order to enable vast areas of desert to be irrigated in dry seasons, and uses the flow to provide electric light and power on a large scale. Both features are illustrated by the stamp, which shows the immense lake 113 miles in length that is forming behind the Dam, and the range of buildings at its foot in which the generators are housed. The mountainous nature of the surrounding country can be realised, and the stamp that tells this story is well-designed and attractive in appearance.



The two German Railway Centenary stamps shown at the foot of the page illustrate another aspect of stamps. The 6pf. shows the first German locomotive, and on the 40pf. stamp is a representation of the most recent product of German railway engineering, a thoroughly modern streamlined train. Each is excellent in itself, but together they have the added interest of illustrating the history of railways in Germany.

In the centre of the page are two stamps of a different kind, chosen from an immense range of stamps carrying maps, one of the favourite devices of stamp designers who have a special purpose in view. The lower of the two stamps, the 1p. Argentine stamp, rather surprisingly reveals a political dispute between the British and Argentine Governments over the Falkland Islands, in the South Atlantic Ocean. These are a part of the British Empire, but are claimed by the Argentine and in the stamp are shown of the same colour as the territory of that country on the mainland of South America.

The central feature of the 4c. Costa Rica stamp is a map of Cocos Island, where many pirates are said to have buried immense stores of gold and silver. A recent visitor to the island said that there is always somebody digging there, and from time to time well-equipped expeditions have set out to search for its hidden treasures. None of these have been successful and many believe that the hoards for which they are looking do not really exist, but a glance at this attractive stamp will always conjure up romantic stories of piracy and adventure.

The remaining stamp illustrated this month is of an entirely different type from many of those already referred to. It is one of a series of New Zealand stamps issued with a purpose, and its attractive design is symbolic, showing sunshine, the Key to Health, through a keyhole.

Stories of native life, the development of special industries and important and romantic historical events are among other topics that have been illustrated by means of special stamps and stamp series, and it is scarcely possible to turn to any page of a general stamp collection without finding some of these.

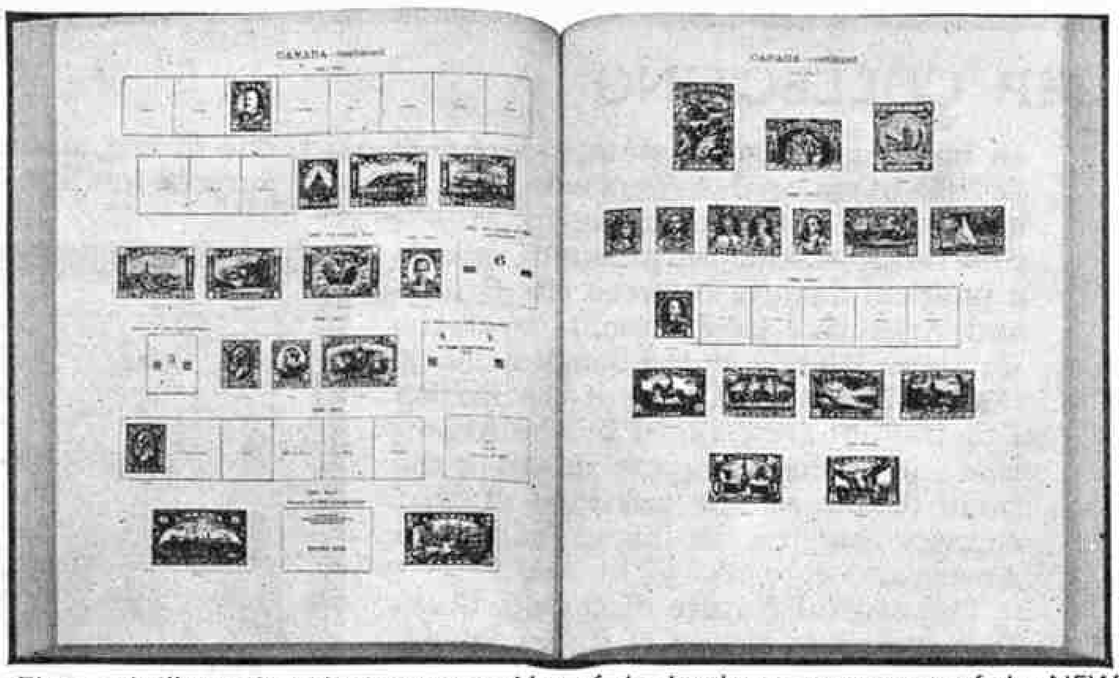
Young collectors usually are greatly interested when they read of the fabulous prices that have been offered for rare stamps. They should not be misled into regarding stamp collecting as a certain means of making money, however. Its greatest reward is the enjoyment to be derived from the stamps themselves. If, in time, the value of the collection increases, that fact should be regarded merely as an incidental happening.

In later articles this winter we shall deal in greater detail with stamps of special interest, and with the problems that often puzzle younger collectors. It is impossible to meet the special requirements of every individual stamp collector in this manner, and any reader who would like to have stamps identified, or would like information of any kind in connection with his hobby, should write to the Editor about it, enclosing any stamps concerned in his query. He will receive a full reply as soon as possible, and any points raised in letters from readers that are likely to be of interest to others will be referred to at greater length in "*M.M.*" stamp pages.

The Finest Stamp Album You Ever Saw!

A SEPARATE SPACE FOR EVERY BRITISH EMPIRE POSTAGE STAMP — 384 PAGES — THOUSANDS OF ILLUSTRATIONS

Costs Only 12/6—The NEW IDEAL BRITISH EMPIRE ALBUM



This small illustration gives you some idea of the handsome appearance of the NEW IDEAL—but it looks better still when it is filled with **your** collection.

A wonderful new permanent album (replacing the old "Ideal" volumes) for British Empire postage stamps from 1840 to the end of King George's reign, with the following outstanding features:

(1) Straightforward alphabetical arrangement. (2) Exclusion of Postage Dues, Officials and minor differences of shade, perforation, etc. (3) Provision of a separate space for each postage stamp, each space containing either a full-size illustration, or details as to colour and value, so that the correct position can be instantaneously found. (4) Strong and handsome cloth binding, well guarded.

Get this album for Christmas and find a new zest in your collecting.

ORDINARY EDITION: 12s. 6d.

Post U.K. 8d., abroad wgt. 5 lb.

INTERLEAVED EDITION: 17s. 6d.

Post. U.K. 9d., abroad wgt. 6 lb.

Two Foreign Countries volumes also in preparation —WRITE TO-DAY FOR FULL PARTICULARS TO

STANLEY GIBBONS LIMITED

Dept. S.15, 391 STRAND, LONDON, W.C.2

TANNOU-TOUVA! TANNOU-TOUVA!!

This month you have an opportunity to secure the magnificent △ Pictorial of Tannou-Touva. It is being presented with a host of other New issues and Pictorials such as **MONGOLIA,** beautiful stamp, Perak new issue, **NIGERIA,** depicting Tin Dredger at work, **TRINIDAD,** view of the first Boca. **CEYLON** 2c. and 6c. with views of Rubber Tapping and Colombo Harbour, Luxemburg, Spain and Suriname (new issues). **ALL FREE AND POST FREE** to applicants requesting approvals.

THE UNIVERSITY STAMP CO., 1, PLANTATION ROAD, OXFORD

IMPROVED

THE "MYSTIC" PACKET

1000 UNKNOWN UNUSUAL UNSORTED 1/6

(Over 200 diff. guaranteed.)

Stamps on paper, etc. Just as received from Convents, Missions, Banks, etc. Guaranteed unpicked. Chance of a **FIND** in every lot. Send to-day for your treasure hunt to-morrow. **3 for 4/3, 6 for 8/-. Abroad 1/9 pkt. FREE! 25** Br. Cols. including the new reign issues to approval applicants. Enclose postage. Overseas 3d. Also **FREE EXCHANGE.**

ASTLEY & CO.
(M), LOWHILL, WOLVERHAMPTON

WAR

Just eighteen years ago the World War of 1914-1918 finished. This terrible War caused many special issues of stamps to be made and during this month we are giving **FREE** a selection of these scarce items. We are calling it the 'War' packet and it includes **AUSTRALIA** (Anzac landing at Gallipoli, Whitehall Cenotaph); **BELGIUM** ('Tin Hat' and German Occupation issues); **CANADA** (War Tax); **CEYLON** (1c. War Stamp sur. on 5c.); **HUNGARY** (1915 surcharge for Widows and Orphans and 1916 War Charity depicting Soldiers in action); **JAMAICA** (War Stamp ovp.); **JUGO SLAVIA**; **NEWFOUNDLAND** (War Memorial); **NEW ZEALAND** (Victory and Peace comm.); **PALESTINE** (Occupied Enemy Territories ovpd.); **RUSSIA** (Northern Army); **TURKEY** (Soldiers off to the front), and **UKRAINE.** While stocks last, we will send this historic collection absolutely **FREE** to all genuine applicants for one of our famous 'Grey' booklets of stamps on approval who enclose 2d. for post, etc.

WINDSOR STAMP CO. (Dept. M), 59, LEE ROAD, BLACKHEATH, S.E.3.

HONG-KONG JUBILEE PACKET

Contains 7 Large **JUBILEE** Pictorials, from **HONG-KONG, SOUTH AFRICA, CEYLON, BR. GUIANA, Australia, India** and **Canada**; Also **Large AIR MAIL** Pictorials from **CUBA, PARAGUAY** and **CHILE**, a fine **New Liberia, TRIANGULAR AIR MAIL**; Large **ABYSSINIAN** Provisional, surcharged in Addis Ababa; Hindenburg **Mourning**; **Fine** set of 5 **HONG-KONG** (K.G.); **Belgian Congo**; Large **BR. NYASALAND** Pictorial; **Scarce ST. VINCENT**; China **Sun Yat Sen**, etc. **ALL** for 1/- only!! (Postage 1½d. extra.) Purchasers asking for **BARGAIN** approvals will receive 2 **Large SPANISH AIR MAILS FREE.**

THE PUKKA STAMP CO., 27, NORMANDY AVENUE, BARNET.

MORE BARGAINS.

3	**ABYSSINIA.** Italian Colony Issue ...	8d.
6	**LIBERIA** Air Mail Commem. Triangles	1/4
25	**BRITISH COLONIALS,** Mint New Issues	1/9
8	**NORTHERN RHODESIA,** ½d.-1/- used	1/-
14	**SOUTH AFRICA** Pictorials, ½d.-1/- ...	8d.
7	**KENYA,** 1c.-50c., Used, 1/-; **6** (without 30c.)	9d.
9	**CEYLON** K.G. Pictorials, 2c.-30c. used	1/-
100	**PERSIA 2/9; 100 FRENCH COLONIALS**	1/9

JUBILEES (Colonials), 15 at **1/6**; 20 at **2/-**

Cash with order—Postage extra.

T. R. Hughes, 'Ibis Cottage,' Long Park, Amersham.

BRITISH COLONIAL PICTORIAL PACKET FREE!

This packet contains **stamps** from **Bermuda, Cayman Islands, Ceylon, Nigeria, St. Lucia,** etc. All unused. Send postcard for cheap approvals. **Prices** ¼d. upwards. Postage paid both ways. **All applications received before noon will be despatched same day.**

T. F. WILLIAMS

7, ISLINGTON ROAD, TOWCESTER, NORTHANTS.

Four Different Iraq free to applicants for ½d. approvals.—Cox, 14, Broadmead Avenue, Worcester Park.

SEND FOR OUR

"ZOOLOGICAL" PACKET

Containing a selection of 45 Foreign and British Colonial Stamps, much better than those usually found in packets of this class, including the following pictorials: **Kenya** (Cranes), **South Africa** (Springbok), **Tchad** (Panther), **Turkey** (Wolf), **Poland** (Eagle), **Madagascar** (Zebus), **Cameroons** (Cattle), **Australia** (Sheep), **Hungary** (Turul) also (Eagle), **Fr. Indo-China** (Ox), **Barbados** (Sea-Horses), **Finland** (Lion), **Epirus** (Eagle), **W. Australia** (Swan), **New Zealand** (Kiwi) also (Fantail), **Mauritania** (Oxen), **Fed. Malay States** (Tiger), **Sweden** (Lion). **Price 6d.** Ask for approval sheets and receive **Andorra** pictorials **Free.**

BRETT & CO.,
201, Uxbridge Road, West Ealing, London, W.13.

FREE! 8 New Zealand 1915-29 K.G., ½d. to 1/-. Request approvals. 25% discount. Enclose 2d. postage. Special bargains for beginners—Stanley Gibbons Album, holds 3,000 stamps. Illustrated. 7½d. 100 different stamps 5½d.—A. R. Dickie, Dept. M., 23, Winscombe Crescent, Ealing, W.5.

---

50 DIFFERENT STAMPS FREE, ask for 4 a 1d. Approvals.—Adams, 100, Banbury Road, Oxford.

He Who Hesitates is Lost

All George V current colonials will very shortly be obsolete. Don't leave it until it is too late. Here's your chance to get them before they become scarce. Buy an Empire Packet, guaranteed to contain only unsorted British Colonials sent out exactly as received from Banks, Trading Stations, and other Outposts of the Empire.

An Empire Packet is the cheapest and best way to fill up the gaps in your British Colonial Collection, includes Silver Jubilees, Commemoratives, New and Obsolete Issues, and heaps of other attractive stamps.

100 for 1/-; 250, 2/-; 500, 3/9; 1,000, 7/3.

All Post Free (Abroad 3d. extra).

I am giving to all purchasers of 3/9 and over a Queen Victoria Labuan stamp cat 2/6.

Remit by Postal Order only.

K. HUMPHRIES (Dept. M.),
East Wittering Road, East Wittering, Chichester, Sussex.

FREE. 40 Zoological Stamps to applicants for our superior Approvals. Good discount and bonus.—M. Riley, 10, Stricklands Road, Stowmarket, Suffolk.

For other stamp advertisements see pages 666, 670 and xxxi

Stamp Gossip

and Notes on New Issues

Music on a Stamp

Two very striking designs have been used for the Brazilian stamps issued to commemorate the centenary of the birth of Carlos Gomes, composer of the Brazilian National Anthem, *"Il Guarany."*

The design shown on this page, and used for the two 700r. values, includes a fragment of the original manuscript for *"Il Guarany."*

There are also two 300r. values showing a medallion bust of the composer, the medallion being surrounded by the inscription *"Brasil Correio 1836-1936 Centenario de Carlos Gomes."*

Algerian Pictorials

A newly issued set of 26 Algerian stamps forms a pictorial presentation of life and scenery in that part of Northern Africa.

We illustrate the 1f. 25 value, showing the Admiralty Buildings and Penon Lighthouse. This design also was used on the 10c., 50c., and 5f. values. The remaining designs are as follows: 1c., 65c. and 2f. 25, a Halt in the Sahara; 3c., 90c. and 2f., L'Arc de Triomphe, Mzab; 5c., 30c., and 1f. 75, Lambese, Ghardaia; 15c., 40c. and 20f. Marabout, Touggourt; 25c., 1f. and 3f. 50 El Kebir Mosque, Algiers.

All the foregoing stamps have horizontal designs. The following are vertical: 2c., 75c., 1f.50 and 10f. Colomb Bechar-Oued; 20c., 45c. and 3f., Moslem Cemetery, Tlemcen.

Mobile Post Office

In recent years the British Post Office has been a model of enthusiastic enterprise. Its latest innovation is a mobile Post Office consisting of a motor van that can be despatched to race meetings, agricultural shows and other outdoor gatherings where postal facilities are necessities. The van contains the full equipment of an ordinary post office including telephone kiosks.

South Australian Centenary

This month we are able to reproduce the design of the South Australian Centenary commemorative stamp to which we referred in our *"Stamp Gossip"* notes in the August *"M.M."*

The Oregon Trail

The United States have issued a special 3c. stamp, illustrated on this page, to mark the centenary of the State of Oregon. The design shows a map on which the Oregon Trail is indicated.

The Oregon Trail is the most famous of all the great roads of America leading from the east to the west. It was the route from St. Louis to the fur country of Oregon and was first travelled over by white men in 1811. Later the covered wagons of settlers went in a constant stream along the road, and in the border panels of the stamp there are representations of a settler's wagon and of a mounted redskin, typifying the constant struggle that went on between the settlers and the Indians in those early days.

The completion of the railway across the United States in 1869 led to the decline of the famous trail, but even to-day there are places in the Western States where grooves worn by wagon wheels may be seen on the prairie.

N.Z. Commemoratives

To celebrate the holding of the 1936 Congress of the British Empire Chambers of Commerce in Wellington, New Zealand issued a special series of five commemorative stamps on 1st October. The stamps were to remain on sale for one month only.

The stamps were of the same size as the New Zealand Silver Jubilee issues and presented striking designs typifying various N.Z. industries. Each of the designs shows a subsidiary vignette in the top left corner and, beneath, a panel containing the inscription "Chamber of Commer e Empire Conference, Wellington, Oct. 1936." The designs were as follows: ½d., the wool industry. A motor lorry loaded with bales of wool, with a sheep shearer at work in the top left corner. 1d., the butter industry. Churning and packing butter, and the head of a prize cow. 2½d., sheep farming. A sheep farm and the head of a prize sheep. 4d., fruit farming. Apple grading and packing and a portrait of a typical farmer's daughter. 6d., shipping. A dockside scene, with a medallion representation of an old-time trade ship in the top left corner.

Each of the five designs is beautifully produced and the set comprises a most striking issue.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations on this page have been made.

French Air Mail Stamps

We illustrate on this page one of the two designs issued by France to commemorate the 100th crossing of the South Atlantic by French airmail service. The design shows a mail aeroplane flying over an old time caravel, and bears the inscription *"Conquête Aerienne de l'Atlantique Sud."*

The other stamp is a 10f. value in horizontal format showing an aeroplane in front of a hemisphere on which the route of the trans-Atlantic air mail service is indicated.

At the moment France has two newly issued 50f. air stamps in current use. One of these appeared on 29th July in small format, and carried the design illustrated on the *"Stamp Gossip"* page of our issue of June last; the other, a larger stamp using the same design surrounded by a network of wavy lines that give it the appearance of a tiny bank-note, was issued on 10th July.

The explanation is that the smaller stamp was actually printed last December, but the Minister of Posts would not agree to its being placed on sale, as he considered the word "Francs" in the design was barely readable. In order to use up the printed stock he proposed surcharging it for use as a 10f. or 15f. provisional, and meanwhile had the stamp prepared in the larger size.

Following the change of Government, the new Minister of Posts decided that the original stamp was suitable for issue, and it was released in spite of the fact that the 50f. "bank-note" stamp was already on sale.

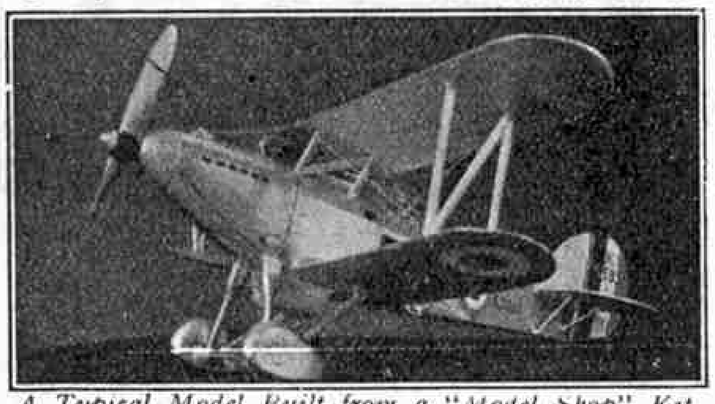
The Bermuda Pictorials

Some little commotion has been caused by the discovery that the yacht illustrated on the 2d. value of the Bermuda pictorial issue, to which we referred in our *"Stamp Gossip"* notes for July last, is the American-built yacht *"Lusie"* owned by a Mr. B. S. Cunningham, of Connecticut, and not Mr. K. Trimmingham's *"Viking,"* the winner of the Prince of Wales Cup, that it had been intended to depict. How the mistake occurred has not yet been explained, but the unfortunate error really signifies nothing, as the object of the stamp was simply to emphasise the importance of Bermuda as a yachting centre.

MAKE THIS A REALLY HAPPY CHRISTMAS!

By giving "MODEL SHOP" KITS.

Our extensive range comprises Hundreds of Kits for SCALE MODEL AIRCRAFT, SUPER DURATION MODELS, MODEL GALLEONS, HISTORIC and MODERN SHIPS, at prices ranging from 10d. to 30/-. Materials and Accessories of Finest Quality. We are actual Manufacturers, and all our Kits and Materials are backed by our "Full satisfaction or Money Back" Guarantee.



A Typical Model Built from a "Model Shop" Kit. The "Mod.Hawker Super Fury," span 22 in.—Kit 10/6 plus 6d. carr.

It will pay you to send for our Fully Illustrated Catalogue—Packed full of Good Things—2d. Post Free.

"Model Shop" Kits may be obtained from most High-Class Dealers, or direct from

The MODEL SHOP, 3, College Road, Barras Bridge, Newcastle-on-Tyne.

NEW MECCANO PARTS FOR OLD!

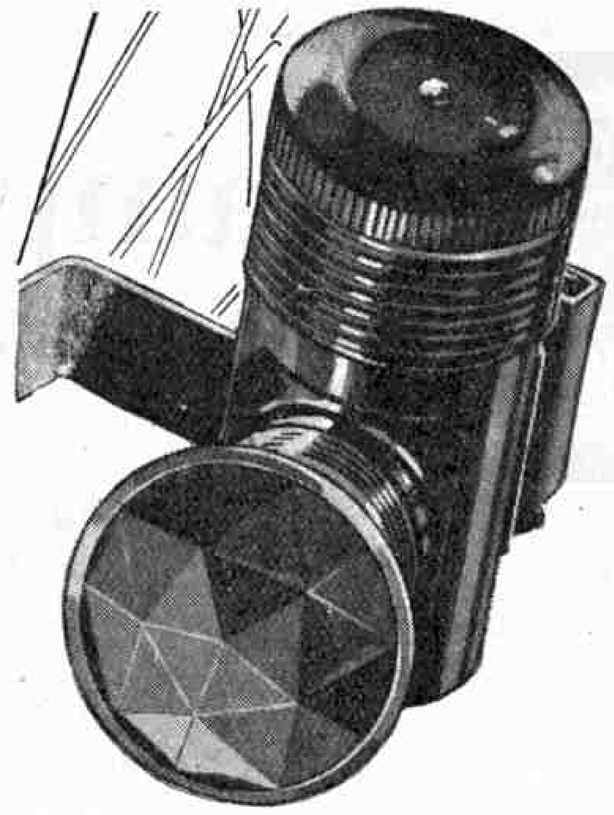
Good News for Meccano Boys

Every Meccano boy should know of the wonderful Meccano Part Exchange Scheme, in order to take the fullest advantage of it.

We undertake to exchange any damaged Meccano parts for similar new parts at half the current list price, no matter how old or how much damaged the parts are. Just send them to us, addressed to the Service Department, Meccano Limited, Binns Road, Liverpool 13, together with a remittance covering half the cost of the new parts. The remittance should include postage on the new parts and will be exactly the same as that you pay on the parcel of old parts you send us.

It is very important that you enclose your own name and address written in plain characters.

If you prefer to do so, you can effect the exchange through your dealer.



Thanks friend

you're seen and safe

An 'Ever Ready' *electric* rear lamp is more than a courtesy to the fellow behind you—it means that you're always seen in time. 35 hours of light cost only 3½d.

Price complete with bracket

1/6

Obtainable everywhere.

EVER READY
REGD. TRADE MARK

ELECTRIC CYCLE LAMPS

THE EVER READY CO. (GREAT BRITAIN) LTD., HERCULES PLACE, LONDON, N.7

"Where There's a Will—"

THERE'S A WAY—of collecting stamps worth having. Have you tried our cheap approvals yet? Let us send you a selection of 4 at 1d. apps. together with another selection of a more advanced type. You will be pleased when you see them.

Do not forget our usual

GRAND FREE GIFT

All applicants for the above approvals will receive this gift of a set of Exhibition stamps, a set of Charity Stamps and a 100 all diff. in addition.

Please enclose 2d. for postage, etc. Without apps.—10d. post free.

The Standard and Universal Stamp Co. (N.M.11)
16, Gloucester Place, Greenwich, S.E.10

CHEAP APPROVALS

My beautiful Approval Selections are ideal for filling those vacant spaces. Pictorials, Colonials, and hard to get items. Selections from 4 a 1d. Free Gift Bi-coloured Persia all applicants.

A. V. TAPP,
108, CHESTERFIELD RD., BRISTOL

CHARKHARI

6 PICTORIALS. (¼a. to 1 Rupee) Free for 30 days (60 days abroad), to approval applicants enclosing 2d. for postage. Write and ask to see a trial selection of our Approval Sheets. You are not obliged to purchase one stamp unless our prices tempt you.

Dept. 252
ERRINGTON & MARTIN, LONDON, E.9

FREE. 25 Superior Stamps. Ask for Approvals.—Goodwin, 9, Robin Hood Street, Nottingham.

100 diff. Stamps Free to approval applicants, good discount.—Gosling, 21, Powling Road, Ipswich.

It's FREE. Complete set of Roumanian aeroplane stamps. Request app.–G. Kingsmill, New Barnet, Herts.

APPROVALS ½d. upwards. P.C. brings good selection.—Purcell, 59, Highbridge Road, Aylesbury, Bucks.

MOROCCO NEWS!

COLONIAL STAMPS OF THE NEW REIGN

Arrangements have been completed for the despatch of

FIRST-DAY COVERS OF KING EDWARD VIII

from each of the 64 Dominions and Dependencies as and when issued on the day of issue. Ensure genuine postmarks by having, delivered by your own postman by nearly every delivery for months, the new stamps direct from all parts of the Empire.

PRICES:

½d., 1d., 1½d. (and where issued ¼d.) from each of 64 Colonies	£1 10 0
As above, but to 3d. value	£4 0 0
Complete set to £1 value...	£100 0 0

Prices for intermediate values, single Colonies, and single Cover on application. All Covers will be registered, except the £1 10 0 set, and not more than four stamps will be used on any one cover. Covers will be of exclusive souvenir design. You may just be in time to have new stamps posted direct to you from the Morocco Agencies, one of the best countries in the Jubilee series. Orders should be placed at once for unused stamps of King Edward. Also these will be delivered on the day after issue.

ARCHIBALD F. McQUARRIE,
161a, Strand, London, W.C.2, England
TEL.: TEMPLE BAR 8642.

FREE SETS of STAMPS

6 Cuba or 6 Imperial China or 6 Straits Settlements or 6 old French, etc. Just send stamps value 2d. and ask for my Approval Sheets containing some high value stamps at low prices and with progressive discounts. State which set of stamps desired to be sent free.

P. ILLINGWORTH,
TRANMERE PARK, GUISELEY, near LEEDS.

New Greek Air Mail FREE

along with 25 other different stamps. Say whether British Colonial or Foreign preferred—to applicants sending 2d. in stamps and requesting our Booklets of Stamps. Special discounts allowed.

The BRAMLEY STAMP CO.,
TOWN END, BRAMLEY, LEEDS.

TRIANGULAR PACKET

This rare and beautiful stamp was issued by Spain to commemorate the explorer Columbus, and shows his Flagship—Santa Maria. I am presenting it FREE, together with a collection of **10 other fine Spanish stamps** to all readers requesting approvals and enclosing 2d. postage. None sent abroad.

MICHAEL HERBERT (Dept. M.M.), 8, Woodstock Road, WALTHAMSTOW, LONDON.

"WORTH WHILE"

Free 25 BRITISH COLONIALS 25 Free

Jubilees, Commemoratives, Pictorials, etc.

Send 1½d. stamp for postage, and ask to see a selection of my **"WORTH WHILE"** approval sheets and receive this excellent **FREE GIFT.**

The best packet you have ever had.

"WORTH WHILE" sheets for stamps Worth While.

JOS. H. GAZE,
21, ATWOOD ROAD, DIDSBURY, MANCHESTER.

Mint Pictorials and Commemoratives

2 Australia "Cable"	8d.	4 Nauru "Jubilee" ...	3/9
3 Australia "South" Cent.	1/8	4 Newfoundland ...	4/-
5 Belgium "Queen Astrid"	1/2	2 New Zealand "Anzacs"	7d.
3 Belgium "Railway"	4d.	4 Straits "Jubilee" ...	2/9
8 Grenada ½d. to 1/-	3/6	7 West Samoa ½d. to 1/-	2/9

Cash with Order. Postage extra.

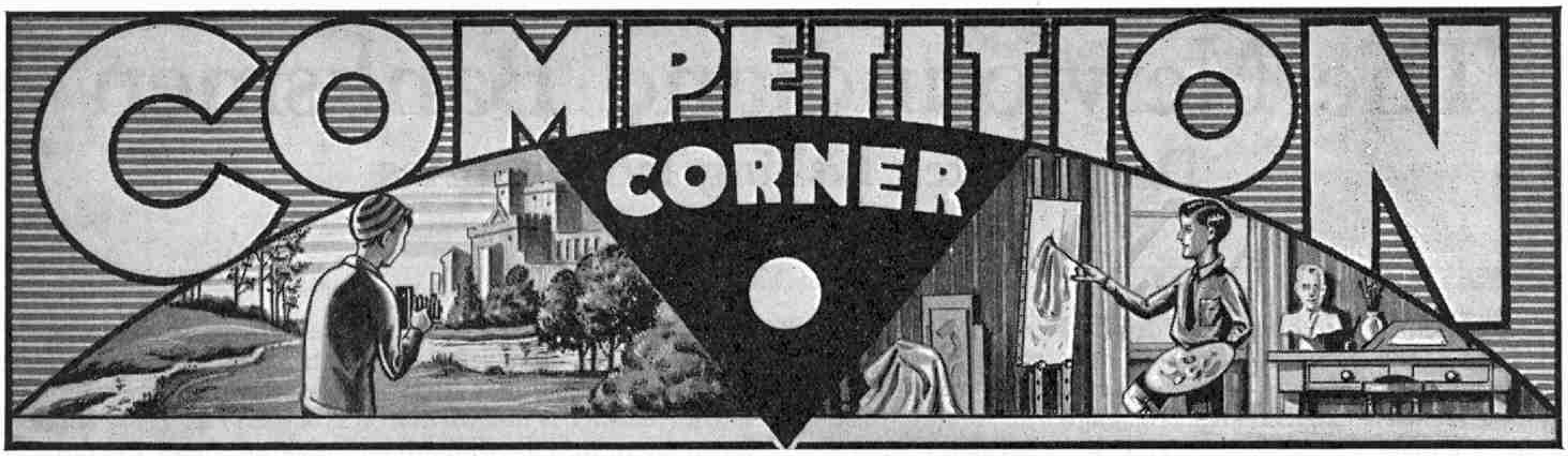
H. L. GOMM,
41, Upper Cranbrook Road, Redland, Bristol 6.

25 BRITISH COLONIALS, mint, used and unused Jubilee, free to genuine approval applicants. Postage 2d.—P. R. Lincoln, 60, High Road, Potters Bar.

For really good approvals try mine. Generous selection sent at ½d. upwards. Enclose stamp.—A. Veitch, 90, Serpentine Road, Wallasey, Cheshire.

STAMPS, 50 FREE to approval applicants.—Burley, 21, Jardine Road, Aston, Birmingham.

For other stamp advertisements see pages 666, 668 and xxxi



"MODERN INVENTIONS" VOTING CONTEST

We are living in an age of invention, and almost every year sees developments in all branches of science and engineering. These enable us to travel about more quickly and comfortably, add to our pleasures, and generally make life easier and brighter, and many of them have led to the foundation of great new industries.

The present century has been rich in inventions of all kinds, and readers of the "*M.M.*" are in a particularly good position to appreciate their value and importance, for they are kept in touch with the work of inventors by articles appearing in its pages. This month therefore we are giving them the opportunity of expressing their opinions on the value of the chief of the outstanding inventions of modern times.

In the panel in the centre of this page is a list of eight of the more important inventions that have appeared since the beginning of the century. Each competitor is invited to state A, which of these, in his opinion, has brought the greatest benefit with it, and B, his idea of the order of importance in which the votes of all the competitors will place them. Those taking part in the competition should note that it is not necessary to place the invention of their choice in the first part of the contest at the head of the list to be given under B, unless of course they think it will be favoured by more entrants than any other.

1. **Automatic Traffic Signals**
2. **Broadcasting**
3. **Stainless Steel**
4. **Talking Pictures**
5. **Television**
6. **Unbreakable Glass**
7. **The Gyro Compass**
8. **The Pre-selector Gear-Box**

Entries should be written on postcards and competitors should refer to the items by their numbers in the accompanying list. Prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the four entries that come nearest to the general opinion of the relative importance of the eight inventions named, as revealed by the voting. In addition there will be several consolation prizes.

Entries should be addressed to "Modern Inventions" Voting Contest, "Meccano Magazine," Binns Road, Liverpool 13," and must reach this office not later than 30th November.

A separate set of prizes will be reserved for entries from Overseas readers, those living outside Great Britain, Ireland and the Channel Islands. Closing date, 27th February.

A Humorous School Story

In our school days, much as we loved the long sunny days on the playing fields and mourned their passing, the winter term was the one we enjoyed most of all. Somehow it seemed productive of more real fun than all the rest of the year put together.

We do not know whether the winter term is still the same prolific source of fun, but we are quite sure that every one of our readers has encountered in the present school term at least one funny incident worth recounting. We therefore offer prizes this month for the best humorous true story of an incident at school this term.

The prizes will consist of Meccano products—this description covers all articles featured in the current Meccano and Hornby Train catalogue—to the value of 21/–, 15/–, 10/6 and 5/– respectively.

Entries, which should be written on one side of the paper only, should be as brief as possible and should be addressed to "School Story, Meccano Magazine, Binns Road, Liverpool 13." A specially late closing date, Friday, 1st January, has been appointed and this will give readers the opportunity to send in the best story of the term.

A separate set of prizes will be available for Overseas readers whose entries must arrive not later than 27th February, 1937.

November Drawing Contest

This month we announce the second of the monthly drawing and painting competitions that we are holding throughout the winter. Competitors may select any subject they like for their entries in this contest and full details of the conditions and the prizes offered were given on page 607 of our October issue.

Entries in this month's competition must be addressed "November Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13." Closing date, 30th November. Overseas, 27th February, 1937.

R	E	T	O	R	T	S	■	D	E	S	I	S	T	S
■	■	A	P	E	■	T	E	E	■	A	T	E	■	■
T	A	P	E	D	■	R	■	L	■	T	E	P	I	D
O	X	E	N	■	C	O	M	E	T	■	M	A	R	E
P	E	R	■	■	■	P	■	T	■	■	■	L	E	A
E	■	■	P	■	A	S	S	E	T	■	S	■	■	L
E	S	T	E	E	M	■	I	■	R	E	P	E	A	T
■	U	■	R	■	E	N	N	U	I	■	A	■	S	■
D	E	S	I	G	N	■	K	■	M	O	R	O	S	E
A	■	■	L	■	D	O	S	E	S	■	E	■	■	A
R	O	D	■	■	■	U	■	N	■	■	■	S	I	R
T	U	R	F	■	S	T	A	G	E	■	B	I	L	L
S	T	A	L	E	■	S	■	U	■	S	U	R	L	Y
■	■	G	E	M	■	E	E	L	■	E	R	E	■	■
A	S	S	A	U	L	T	■	F	L	A	N	N	E	L

The Overseas section now having closed, we give above the solution to the May Crossword Puzzle.

COMPETITION RESULTS

September Photo Contest.—The September Photo Contest, the last of the 1936 season, was easily the most popular of the series, and the entries in it were of such outstanding merit that the prize list has been extended and includes nine more awards than were originally offered. Five of these are special prizes of 7/6 each in the A Section, in which the entry was not only the heaviest in number but also the most impressive in quality that we have ever received in a "*M.M.*" photographic contest.

First Prizes: Section A, D. H. WARNER (Richmond); Section B, D. EARLE (Wembley Park, Middx.). Second Prizes: Section A, C. P. SILVER (Exeter); Section B, D. A. WOODS (Bexhill). Special Prizes: E. H. COLES (London, W.11); D. MORLEY DAVIES (Maesteg); D. FEAR (Taunton); B. HOMER (Birmingham, 8); C. M. SINCLAIR (Glasgow, S.W.2). Consolation Prizes: T. BROOKS (Halifax, Yorks.); D. PHAYNE (Wokingham); MISS G. PENNETHORNE (Haywards Heath); E. M. READ (Edinburgh 10).

September "Point Words" Contest.—1. W. G. B. EDMONDS (London, S.W.16). 2. C. J. B. BRETT (Great Coates, Lincs.). 3. K. FORD (Waleswood). 4. L. W. CHITTY (London, S.W.20).

OVERSEAS

June Photo Contest.—First Prizes: Section A, B. PARKER (Montreal); Section B, D. N. MUNRO (Sydney). Second Prizes: Section A, P. NATH ROY (Calcutta); Section B, S. P. WALLACE (Capetown).

June Doublets Contest.—1. E. K. SHORROCK (Vancouver, B.C.). 2. R. RUSSELL (Whangarei, N.Z.). 3. D. TOLKOWSKY (Tel-Aviv, Palestine). 4. R. BURBERY (Christchurch, N.E. 1).

NOTICE TO INTENDING COMPETITORS: Entrants to drawing and similar competitions are asked to note that unsuccessful entries can only be returned if a stamped addressed cover is sent with the entry.

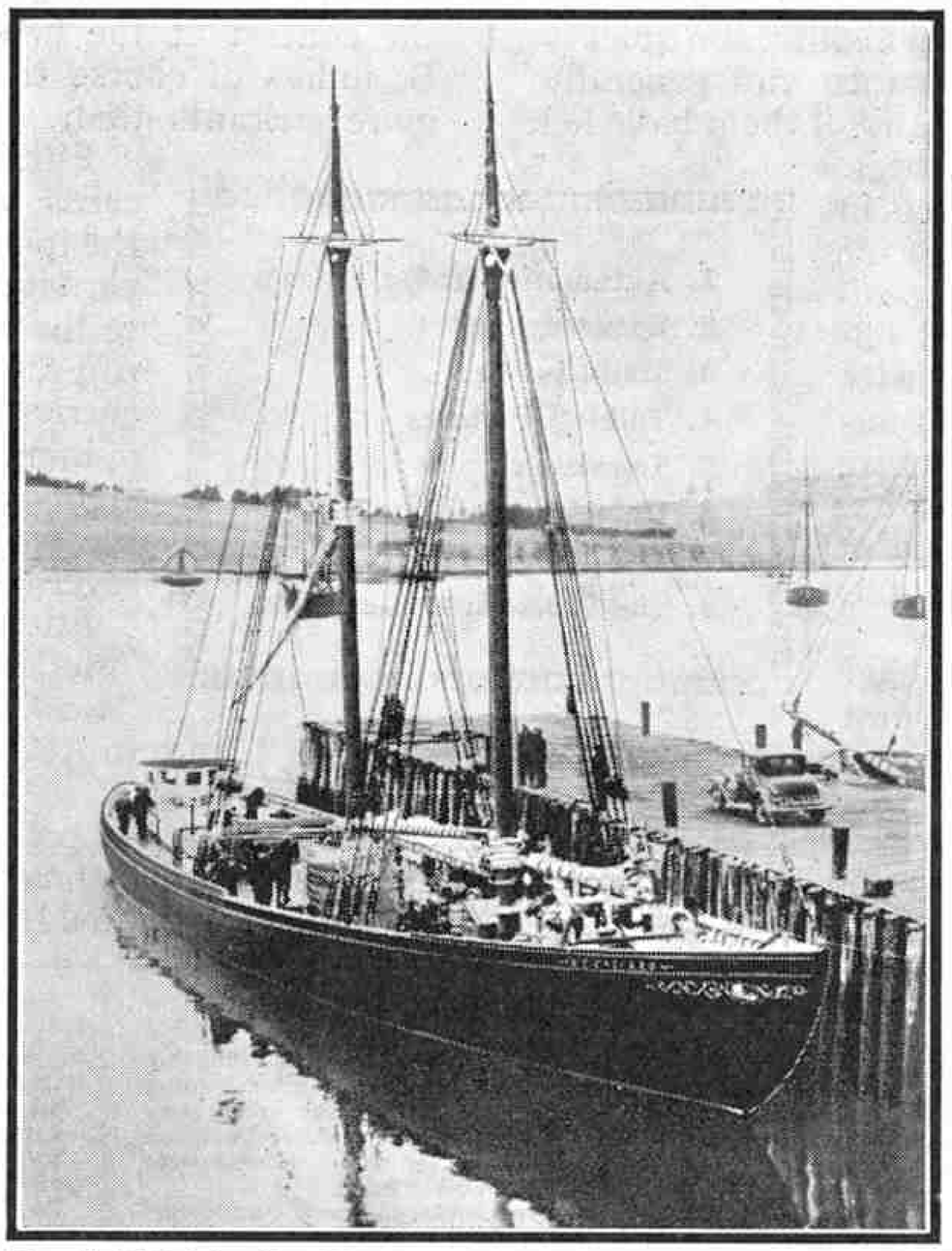
The Newfoundland Banksmen

Deep Water Fishing from Dories

By D. G. Lyon

THE schooners operating from Lunenburg, Nova Scotia, the home of Canadian deep water fishermen, show many differences in design and equipment when compared with English vessels engaged in similar work. This is chiefly due to the greater distance of the fishing grounds from their home port, and the extension of their activities into fresh water fishing in lakes and rivers during the winter months. Although practically all these fishing schooners have deserted sail, and instead use Diesel engines, they are still built with attractive lines and carry tall tapering spars.

One of the largest schooners of the Lunenburg fleet is the "*E.F.Zwicker*," which is shown in our illustration. Native woods were used in the construction of the hull of this vessel, which has a length of 142 ft. and a beam of 27 ft. 6 in., with a hold 11 ft. in depth. The keel and frames are of hard woods, with planking of birch and beech and white pine decks, and a point of constructional interest is the use of trenail fastenings in the planking instead of the less expensive galvanised bolts used by English builders. There are comfortable quarters for the captain and crew of 24 men, and a galley of ample dimensions is provided, for the schooner may remain at sea as long as two months in one trip, during which time the cook has to prepare 100 meals a day for hungry men.



The "E.F.Zwicker," a Diesel-engined schooner from Lunenburg, Nova Scotia, that is employed in line fishing on the Grand Banks of Newfoundland in summer and on lakes and in rivers in winter.

Deep water fishing is generally carried on in the neighbourhood of the Grand Banks of Newfoundland. This region, where the Gulf Stream meets the cold current flowing down the coast of Labrador, is one of the world's great fisheries, for an abundance of the plankton, or plant life, on which fish feed, is carried down into it from the open Polar waters to the north. Line fishing is employed, and most of the fish caught are those frequenting the sea bottom, among them being cod, halibut and haddock.

When a schooner arrives on the Banks, small boats called dories are launched, each manned by two fishermen who proceed to set lines. The "*E.F.Zwicker*" has 11 dories nested on her deck. From each dory a main line, with short lines carrying hooks branching off at every 5 ft., is anchored to the sea bed and marked with buoys. A single crew may set up to two miles of line equipped with 2,000 to 3,000 hooks, and altogether in one setting there may be a total of more than 20 miles of line and 30,000 baited hooks. Hauling in takes several hours, especially if the tide is strong or the sea rough, and fishing in this manner is not without its dangers, for if fog comes down there may be difficulty in picking up all the dories that have been sent out.

The centre section of the schooner, 43 ft. in length, is reserved for the catch. During the fresh fishing season ballast is carried to a depth of 5 ft., leaving only 6 ft. of hold for storage; and to ensure prime quality this is again divided into small bins by vertical and horizontal partitions so that the greatest depth to which fish can be piled on each other is only 3 ft. More than 100,000 lb. of fresh fish can be iced in these compartments. The tables on which the crew bait their lines are arranged along the centre of the hold, but if fish are plentiful this section also is utilised for storage. The crew then give up their comfortable working quarters and bait their lines on deck, as their fathers and grandfathers had to do in the old-time schooners of the Newfoundland Banks fishing fleets.

During salt fishing in summer, all gear is handled on deck and ballast is removed. This gives an increased carrying capacity, enabling the crew to pull 1,000,000 lb. of fish out of the sea, salt them and dress them in a single trip. The largest catch of fresh fish ever landed at Halifax was discharged there recently by the "*E.F.Zwicker*," and amounted to 210,000 lb.

The main engine of the vessel is a 240 b.h.p. five-cylinder Diesel of British make, and is controlled by a single hand wheel so that it can be started ahead or astern at any desired speed from a quarter to full. The manoeuvre from full ahead to full astern, or vice versa, can be carried out in from five to seven seconds. The fuel tanks have a capacity of 3,880 gallons, allowing a range of 3,500 miles at the full speed of $10\frac{1}{2}$ knots.

Power for essential services such as electric lighting throughout the vessel, and a supply of sea water under pressure for washing down decks and hold, are supplied by auxiliary machinery. The pumps and lighting dynamo are driven by a small 5 b.h.p. Diesel engine, and the dynamo charges 16 storage batteries of 13 plates each that supply current to operate the vessel's wireless as well as the lighting system.

Hamley's Model Aero Contest

Those of our readers who are interested in the construction of scale model aeroplanes will be pleased to know that Hamley Bros. Ltd. have decided to hold an annual competition for model aeroplane construction. The first of these competitions is now in progress and will remain open until 31st December next.

Competitors are required to construct models from one or another of certain specified construction kits, and challenge trophies and cash prizes will be awarded to the successful entrants.

Full details of the competition and entry forms may be obtained from Hamley Bros Ltd., 200-202, Regent Street, London, W.1.

New Cycle Accessories

Bluemel Bros. Ltd., are again to the fore with additions to their famous range of lightweight cycle accessories. Several of these, and particularly an extra-long rear mudguard, will satisfy a long-felt want among riders of lightweight cycles.

The new mudguard is both efficient and neat in appearance. It is similar in many ways to standard Bluemel lightweight guards, but is thirteen inches longer and is secured in place on the machine by three, instead of two, stays. Its additional length will be a great boon to club riders in checking back-flung water and mud.

Lightness and freedom from rattle are outstanding features of another new rearguard, known as the "Duplex," in which the rear reflector actually forms part of the guard. This idea not only saves weight but also eliminates the crevices that seem to invite mud deposits on the average guard with a separate reflector.

Bluemel Bros. Ltd., Wolston, Nr. Coventry, will send full details of these new accessories to any "*M.M.*" reader who is interested.

Waiting for the starter's signal in a Hornby Speed Boat Race at Westgate-on-Sea. The starter is Mr. Clay Thomas, of the "Sea-Mews" Concert Party, who organised the races. Photograph by Mr. E. Owen.

The Ceuta-Tetuan Railway

By J. S. SCRUTON

The railway between Ceuta and Tetuan, in northern Africa, is about 20 miles long, and is single track except at wayside stations, where there are passing loops. At Ceuta the line runs along the whole length of the main quay, so that passengers disembarking from touring liners can board trains immediately if they wish to visit Tetuan. The locomotives in use on the line are old American ones. The coaches are of the standard length, and have no glass in the windows, and are comfortable to ride in although they have wooden seats, as the track is remarkably good.

The five wayside stations have no platforms, but only small neat buildings painted in green and white. A chain is the only guard provided at road crossings. This is rather surprising, for the roads are used by many cars and trains run frequently. The chain at each crossing is in charge of an official, who usually seems to spend the remainder of his time with his goats, which graze by the lineside. The signals, of which there are very few, are all worked by hand.

A City of Cyclists

By B. UNNE

This summer saw the realisation of what had long been one of my ambitions—a visit to a foreign country. I travelled by cargo boat from Hull to Copenhagen and was fortunate in having ideal weather for my sea voyage of about 600 miles, which occupied about 50 hours.

On my first view of the city I was impressed by the number of high ornamental towers and mellow green domes that are to be seen. Most of these are on churches or public buildings, and have galleries on them at different levels.

A channel that divides the city into two parts is crossed by lift bridges carrying footpaths and roadways with tramcar tracks. These bridges can be raised and lowered very rapidly, and this is necessary because of the large amount of traffic on the waterway. During the short periods when road traffic is stopped, long lines of cyclists assemble on both sides of the bridges. Almost everybody in Copenhagen seems to ride a bicycle, and in proportion to its population the city has more cyclists than anywhere else in the world.

As a capital city and port, Copenhagen is a natural centre of the culture and commercial life of Denmark. No activity is more picturesque than the local fishing industry, which seems to penetrate to the very doors of the houses through the many small canals and waterways that run right into the city.

Steelstrand Expanders

The National "Keep Fit" campaign that is now gathering momentum, gives special interest to the advertising of Herbert Terry and Sons' Steelstrand Expanders that appears in our current issue. Messrs. Terry, who have specialised in the manufacture of all types of springs for more than 80 years, have developed an attractive series of spring exercises for boys and adults.

Our advertisers have sent to us a range of the exercise charts that are packed with each of their exercisers, and we have been interested to see the beneficial series of exercises that can be carried out.

Herbert Terry and Sons Ltd., Redditch, will be pleased to send full details of their exercisers to any reader who writes mentioning the "*M.M.*"

Bond's 1937 Catalogue

The latest edition of Bond's General Catalogue contains a mine of information of help to all who are interested in model making and model railways.

The catalogue, in addition to listing hosts of complete models, mechanisms, castings, fittings, gears, machine and hand tools, marine engine and electric pumps, includes a new 14-page feature of hints and tips on model making and the maintenance of a model workshop. The catalogue can be obtained price 6d., including postage, from Bonds O'Euston Road Ltd., 254, Euston Road, London, N.W.1.

We Strongly Recommend

A First Electrical Book for Boys

By ALFRED MORGAN *and* C. L. BOLTZ, B.Sc. *With about* 140 *illustrations.* 5/- *net*

For boys of about 10–13, this book describes the history of electricity and its uses, and tells about magnetism, batteries, electric bells, how heat is produced by electricity, telegraphy, how electricity transmits speech, electric light, the electrical system of a motor-car, wireless, electro-chemistry, etc. Mr. Morgan is part-author of the well-known book *The Boy Electrician*, while Mr. Boltz has written *Everybody's Electricity*, *Wireless for Beginners*, etc.

FROM ALL BOOKSELLERS

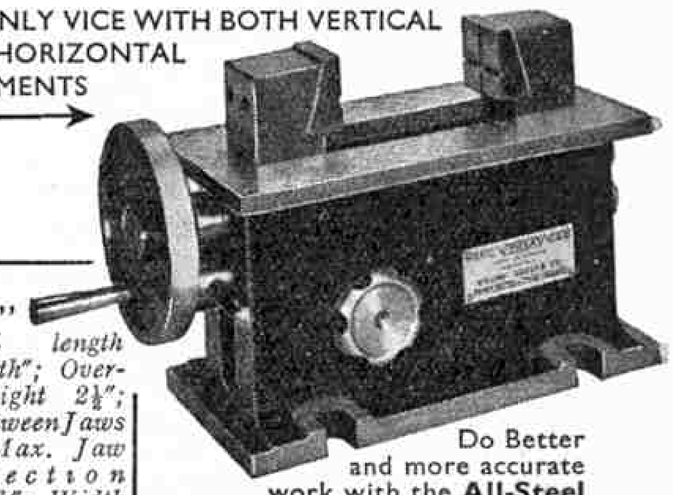
HARRAP

182, High Holborn, London, W.C.1

The indispensable unit for all FINE work!

Ideal for Model-Making and all precision jobs

THE ONLY VICE WITH BOTH VERTICAL AND HORIZONTAL MOVEMENTS



Model "MINI" *Overall length 7 5/16th"; Overall height 2½"; Gap between Jaws 2½"; Max. Jaw Projection 13/16th"; Width of Jaw ¾"; Weight 6 lbs. PRICE* **£1 17 6**

Model "MEDI" *Overall length 13"; Overall height 4¾"; Gap between Jaws 3⅝"; Max. Jaw Projection 2"; Width of Jaw 1⅜"; Weight 32 lbs. PRICE* **£4 17 6**

Carriage and Packing Free.

Do Better and more accurate work with the **All-Steel**

VERSA-VICE

MADE BY ENGINEERS **FOR** ENGINEERS

The projection of the Gripping Jaws above the surface of the Face-Plate being instantly adjustable, objects may be gripped by as little as .005"—firmly, but without distortion. Working is thus facilitated, as the VERSA-VICE secures the job without obstruction of any kind.

Indispensable for Fitting, Toolmaking, Drilling, Milling, Shaping, Engraving, etc.

Patent No. 405,085/34

Send Now for FREE Descriptive Folder to:

WILLIAM FROST & CO. Engineers

(Dept. M.M.), 1, St. Nicholas Buildings, NEWCASTLE

43/46, Southampton Buildings, Chancery Lane London, W.C.2

Metcalf Ad.

A LITTLE BIT INDEPENDENT

Thompson: "There goes the most independent man I ever met; he takes orders from nobody."
Jones: "Who is he?"
Thompson: "A commercial traveller."

* * * *

Repair Man (having pushed door button repeatedly without response): "Fancy ringin' me up to come and mend the doorbell and then goin' out!"

* * * *

Here lies the body of William Jay,
Who died maintaining the right of way;
He was right, dead right, as he sped along,
But he's just as dead as if he was wrong.

* * * *

Madame: "Liza, why didn't you sweep the cobwebs down?"
Liza: "Why, ma'am, I thought it was part of the radio."

* * * *

Tom: "I've had a most exciting time with my car."
Dick: "Yes?"
Tom: "I bought a carburetter that saved 50 per cent. of petrol, an induction gadget that saved 30 per cent., and a sparking plug that saved 25 per cent., and after I had gone 10 miles my petrol tank was overflowing!"

* * * *

Mrs. I. Swank: "My first husband was a man of distinguished bearing. He was known as 'Thompson of the Guards.'"
Mrs. Sar. Castic: "Indeed! Goods or passenger?"

* * * *

First Workman: "It's a new thing for the foreman to praise me."
Second Workman: "What did he say?"
First Workman: "He says me work's been very perfunctory."

* * * *

"Are you a doctor?" asked a young lady, stepping into a chemist's shop.
"No," replied the youth behind the counter. "I'm just the fizzician."

* * * *

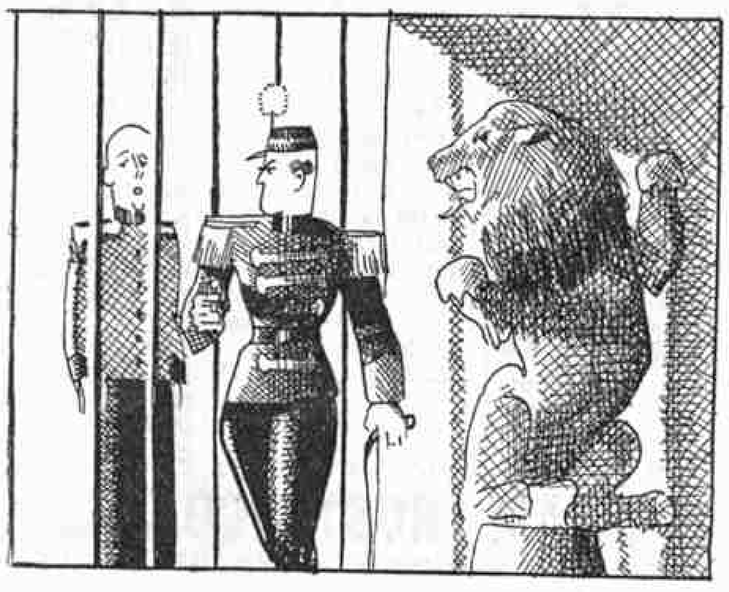
An enthusiastic supporter of the local football team arrived at the ground one day and saw a load of bricks there. He approached the club secretary and asked: "Wouldn't half-bricks have been better?"
"Half-bricks?" replied the secretary. "We couldn't build a pavilion with half-bricks."
"Oh, I see," said the supporter. "I thought they were for the referee."

* * * *

Mother: "Did you put 'Love to Grandpa and Auntie Dorothy' at the end?"
Betty: "Yes, Mummie."
Mother: "You didn't forget Uncle John, Cousin Bill, and the others?"
Betty: "No, I just put 'and Co. Ltd.,' for them."

* * * *

A WARM WELCOME



Servant (to lion tamer in cage): "That grocer is here again demanding payment of his bill."
Lion Tamer: "Send him in."

A SUITABLE INMATE

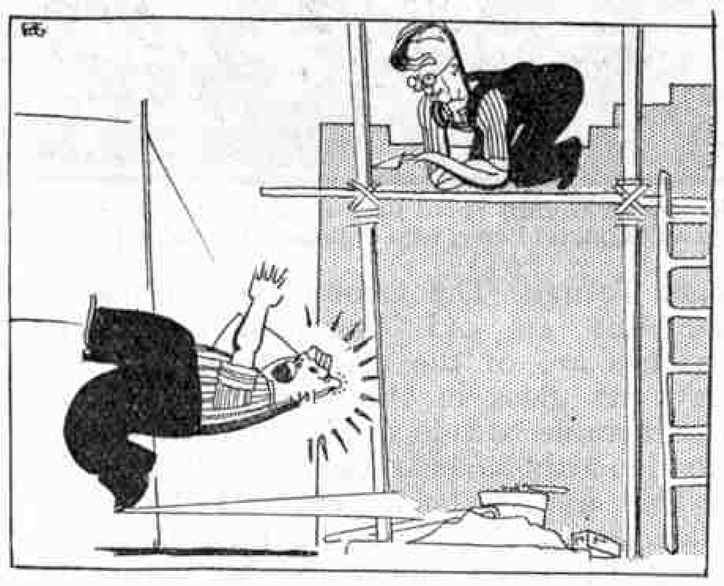
Fat Gent.: "Am I all right for the Zoo?"
Johnnie: "You look all right to me, mister, but I'm not running the place."

* * * *

House-owner: "I'm glad you stopped complaining about the plaster falling."
Tenant: "It's all down now."

* * * *

NOTHING TO HOWL ABOUT



A bricklayer was working on a scaffold when suddenly a brick slipped from his hand and dropped on to the head of his workmate, who was mixing mortar below.
The unfortunate man started dancing about and groaning in his agony. The bricklayer stared down with contempt in his eyes.
"Come, come!" he yelled at last. "It can't have hurt as much as that, man. Why, it wasn't on your head half a second!"

* * * *

Boss (to office boy who is late): "You should have been here at nine o'clock."
Office Boy: "Why, wot 'appened?"

* * * *

The lecturer paused a moment, and then remarked: "Of course you all know what a corpuscle is like."
"Most of us do," remarked the chairman, "but you'd better explain it for the benefit of those who have never been inside one."

* * * *

Father: "Son, can't you cut down on your college expenses? You know you are almost ruining the family."
Son: "Well, I might possibly do without any books."

* * * *

"If a Chinaman went to a dentist to have a tooth drawn, what time would it be?"
"Give it up."
"It would be half past two, of course."
"How do you make that out?"
"Half past two is two-thirty, isn't it?"

* * * *

"Why does your wife always close her eyes when she is singing?"
"Well, you see, she reaches such high notes that she becomes giddy."

* * * *

Johnson had just returned from a trip abroad and was making his report to his employer. Presently his expenses-sheet came under review. "What is this large item? "asked the employer.
"That's my hotel bill, sir," replied Johnson.
"Huh! Don't buy any more hotels next time you go abroad."

* * * *

Perks: "You say he's very sure of himself?"
Jinks: "I'll say he is. He does crossword puzzles with a pen."

* * * *

Small voice from pantry: "Mummy, you know when it says break six eggs?"
Mother: "Yes, darling."
Small Voice: "Well, I've done that."

A SAFE RETREAT

First Dentist: "What do you think of my new offices? You see, the fire escape here makes my waiting room one of the safest rooms in the building."
Second Dentist: "Safe nothing! I lost twelve patients that way."

* * * *

Dr. Kiddem: "How did that diagnosis machine work you had installed in your surgery?"
Dr. Killum: "Oh, I treated a man for three months because that old machine said he had yellow jaundice."
Dr. Kiddem: "And was it correct?"
Dr. Killum: "No, he was a Chinaman."

* * * *

Teacher: "Now Bobby, tell me the names of some stars."
Bobby: "Football or film, miss?"

* * * *

"Doctor, how am I?" quavered the patient. "Oh, you're much better," replied the medico, breezily, "but I wouldn't start reading any serial stories if I were you."

* * * *

Belle: "I've taken three lessons in French from a correspondence school."
Agnes: "Could you carry on a conversation with a Frenchman?"
Belle: "Oh, no, but I could talk to anybody else who had had three lessons."

* * * *

Employer: "Rather strange, Jones, that your uncle should be buried on Cup Final day."
Jones: "Yes, good old uncle—a sportsman to the end."

* * * *

An Irishman got a job at a railway station. When the first train came in, however, he forgot the name of the station, so he called out: "Here ye are for where ye are going. All in there for here, come out."

* * * *

Tutcham: "I asked you for a loan of twenty pounds! This is only ten."
Smith: "I know it is, but that's the fairest way; you lose ten and I lose ten."

* * * *

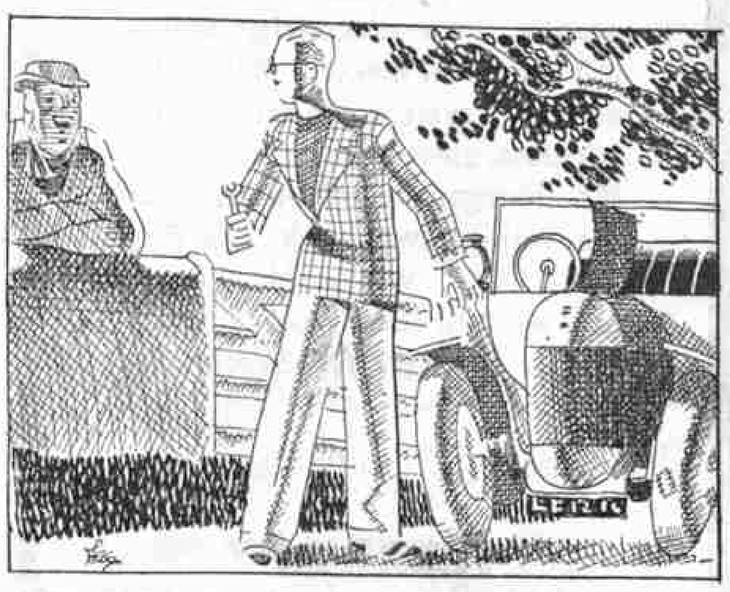
Teacher: "Now, if I subtract 25 from 37, what's the difference?"
Jimmy: "That's what I say. Who cares?"

* * * *

A man went up to a railway porter at one of our big railway stations and said: "There are six clocks in this place, and they are all different."
"Well sir," said the porter, "if they were all the same one would do!"

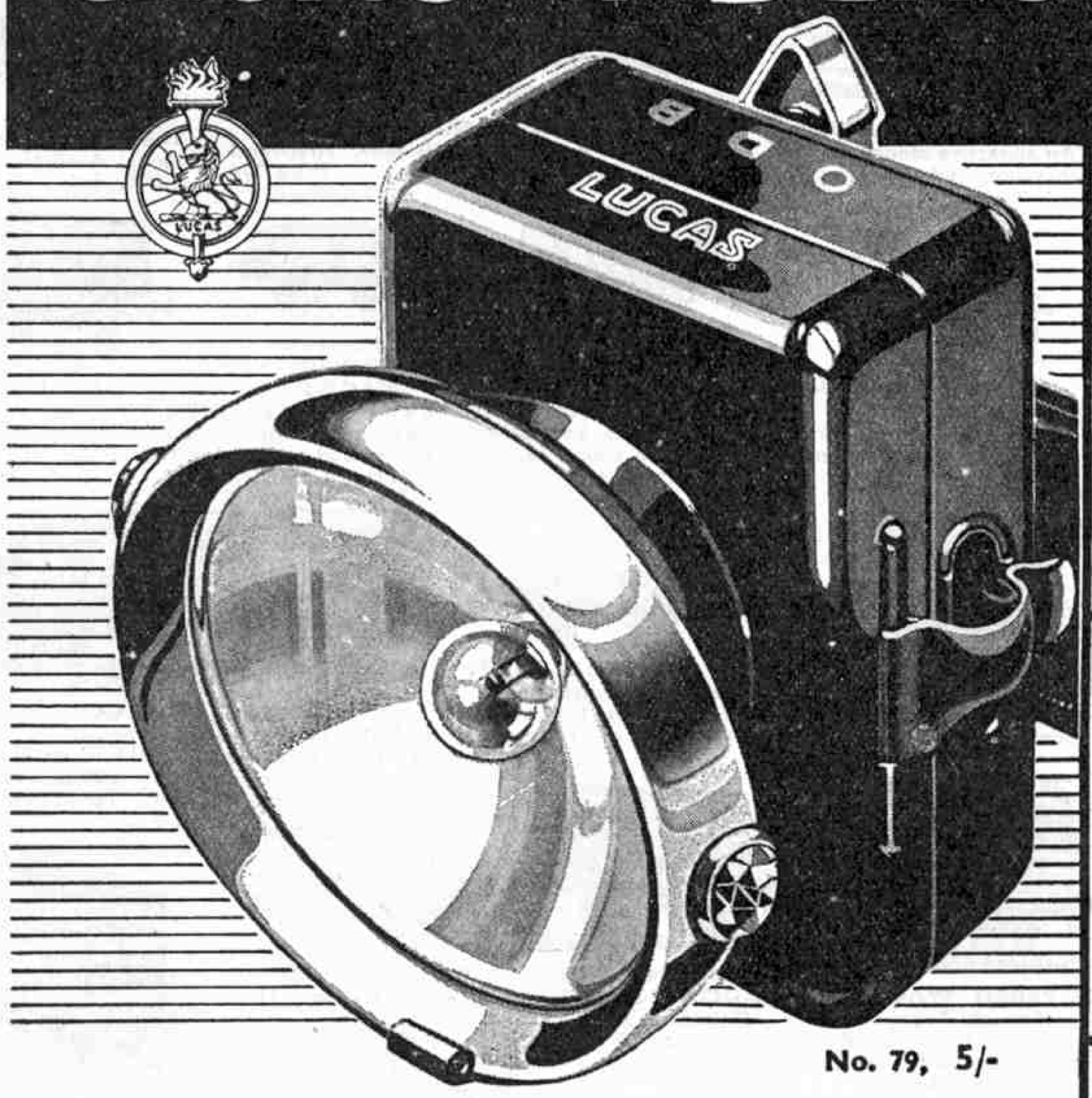
* * * *

HE ASKED FOR IT

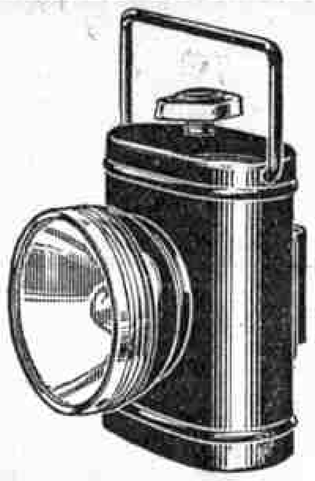


The old farmer had watched the motorist working on his secondhand car for about an hour.
"What are you looking at?" asked the motorist. "Is this the first motor car you ever saw?"
"No," was the dry reply, "but it's very much like it."

The Finest Range & Widest Choice of Battery Lamps

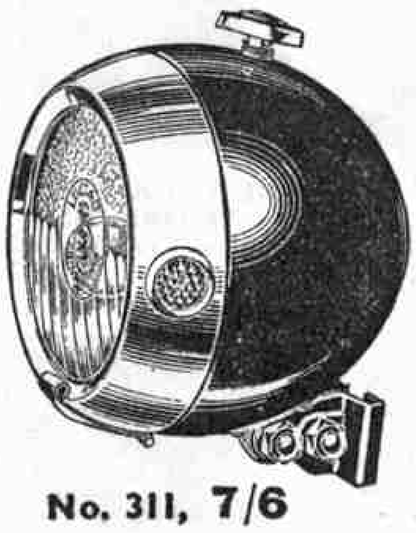


No. 79, 5/-

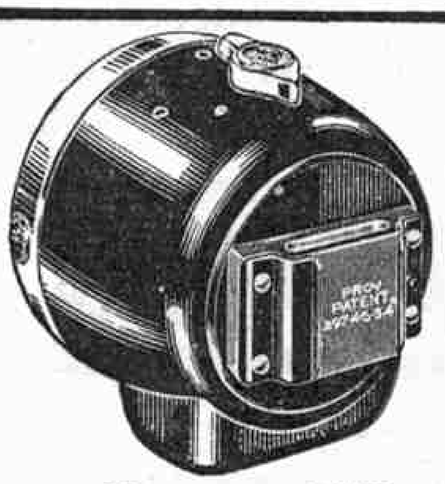


No. 68, 2/6

No. 69DRS, 4/3



No. 311, 7/6



No. 310RS, 7/6

Here are five typical Lucas Battery Cycle Lamps, unrivalled in design, durability, finish and value, and backed by the "King of the Road" reputation for over fifty years.

Among the new models, a noted improvement is the patented Shock-Absorbing Rubber Bracket and Battery Cushion in one piece (see Nos. 69DRS and 310RS illustrated). Even the least expensive Lucas models have "de luxe" features such as heavy-gauge metal bodies, polished silver-plated reflectors, positive switches, tested bulbs and Lucas long-life "Leadership" Batteries.

There are many other Lamps in the wide Lucas range, which includes battery models from 2/6 to 18/6. See them at your dealer's, or write to Dept. K for free illustrated literature.

LUCAS

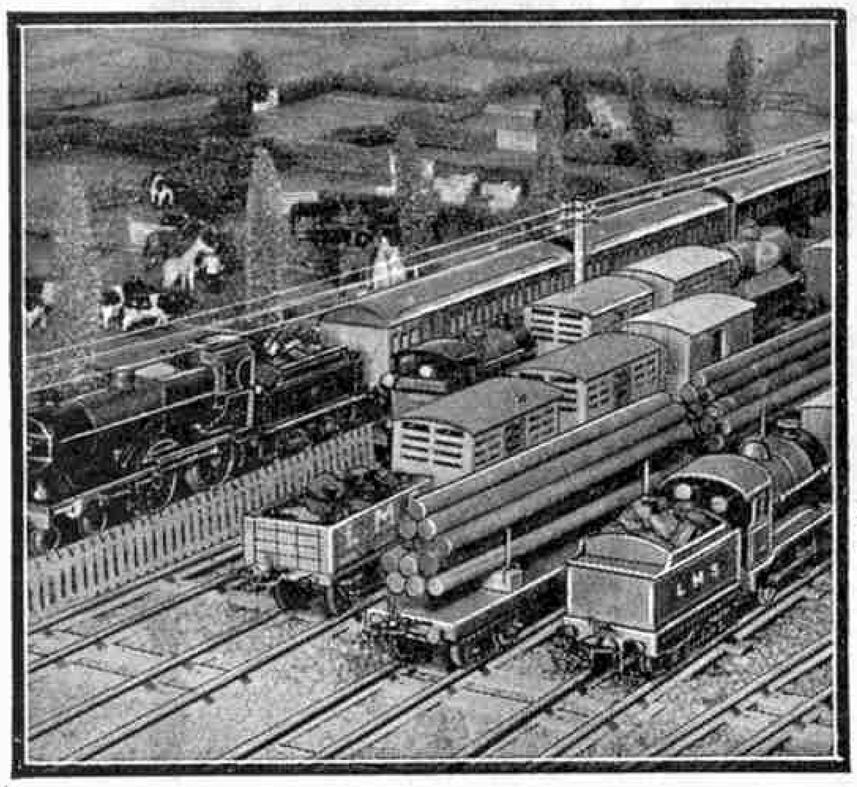
"KING OF THE ROAD"

CYCLEALITIES

JOSEPH LUCAS, LIMITED · BIRMINGHAM 19

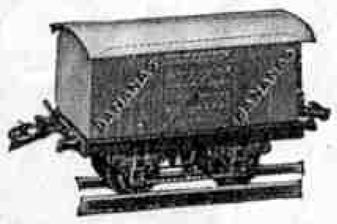
HORNBY ROLLING STOCK

GAUGE O

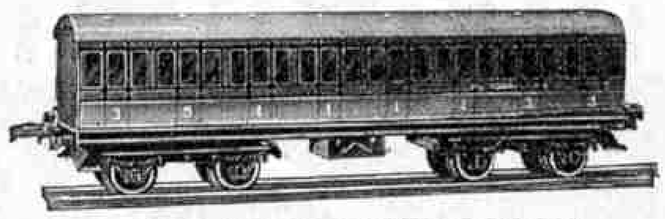


The Hornby Series includes a splendid range of realistic Rolling Stock. Each item is fitted with patented and exclusive automatic couplings, a special feature that places it in a class entirely of its own. There are Pullman Cars, Passenger Coaches, Guards' Vans, Tipping Wagons, Lumber Wagons, and many other types, all beautifully finished.

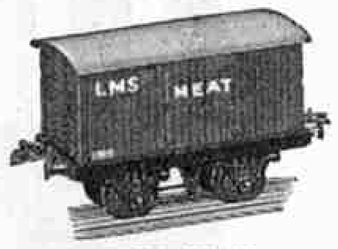
An attractive selection of Hornby Rolling Stock is illustrated and described on this page. Ask your dealer for a complete price list.



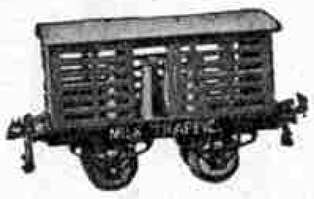
No. 1 BANANA VAN
An attractive model, finished in yellow and red. Price **2/9**



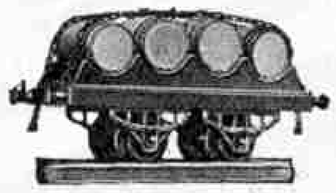
***No. 2 PASSENGER COACH**
Suitable for 2-ft. radius rails only. First-third or Brake-third. Price **7/6**



MEAT VAN
This is a very realistic model. Available lettered L.M.S. only. Price **1/9**



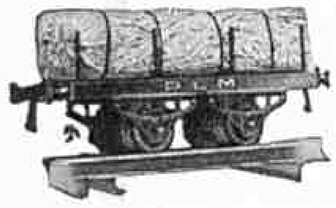
No. 1 MILK TRAFFIC VAN
Fitted with sliding doors. Complete with milk cans. Price **2/11**



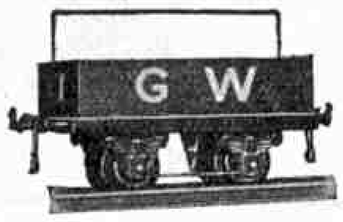
BARREL WAGON
This is another interesting model of a type of wagon used in France and other European countries. Price **2/6**

No. 1 TIMBER WAGON
Beautifully enamelled in yellow and red. Price **1/6**

No. 1 SIDE TIPPING WAGON
Excellent design and finish. Lettered "Robert Hudson Ltd." Price **2/-**

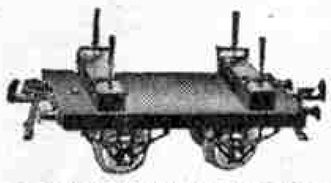


FIBRE WAGON
This is an interesting model of a type of wagon used in France and other European countries. Price **1/3**



***OPEN WAGON "B"**
Similar to Hornby Wagon No. 1 but fitted with centre tarpaulin-supporting rail. Price **2/-**

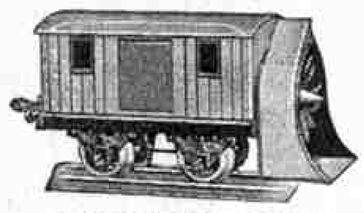
***GUNPOWDER VAN**
Finished in red. With opening doors. Price **2/9**



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Price **1/6**

No. 2 SALOON COACH
Realistic in design and beautifully finished. Two types are available: L.N.E.R. (as illustrated) enamelled brown, and L.M.S. enamelled maroon. Suitable for 2-ft. radius rails only, Price **9/6**

WINE WAGON DOUBLE BARREL
An attractive model artistically enamelled in red and green. Price **4/6**

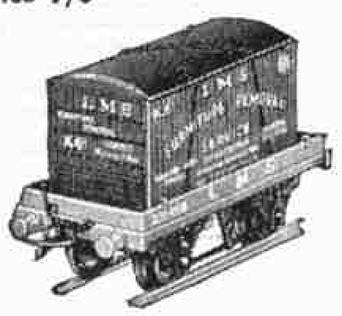


SNOW PLOUGH
With revolving plough. Price **3/9**

COVERED WAGON (French Type)
This wagon is fitted with frame and sheet. Lettered "Nord" Price **2/6**

BITUMEN TANK WAGON "COLAS"
Finished in blue. Price **3/6**

GAS CYLINDER WAGON Price **1/11**



***FLAT TRUCK**
Complete with Container. Price **2/-**

CONTAINERS
L.M.S.R. (Furniture), L.N.E.R. (Goods), G.W.R. (Insulated), S.R. (Ventilated). Price **6d.** each

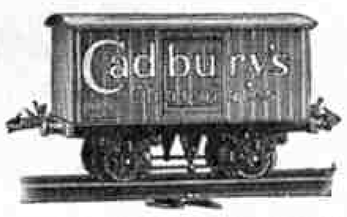
No. 1 PETROL TANK WAGON "B.P."
Finished in yellow. Price **2/-**

OIL TANK WAGON "MOBILOIL"
Finished in battleship grey. Price **2/-**

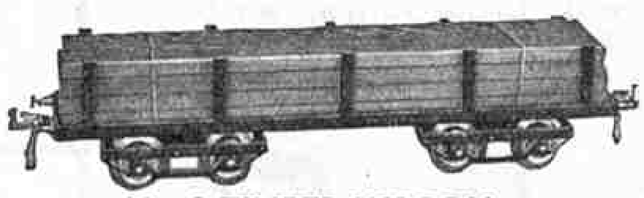
COAL WAGON
Similar to Hornby Wagon No. 1. Fitted with an embossed representation of coal. Price **2/3**

No. 1 ROTARY TIPPING WAGON
Finished in orange. Price **2/6**

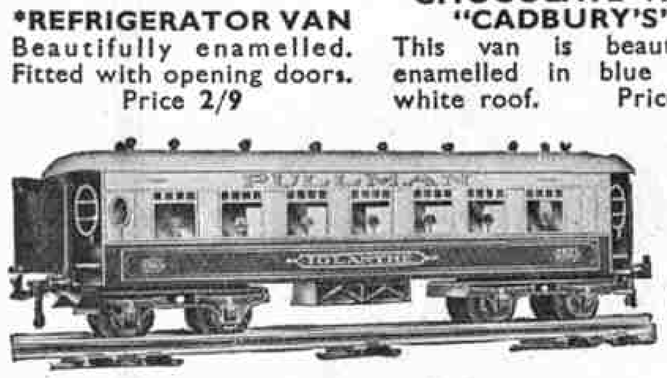
***REFRIGERATOR VAN**
Beautifully enamelled. Fitted with opening doors. Price **2/9**



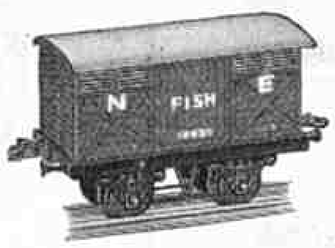
CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof. Price **2/9**



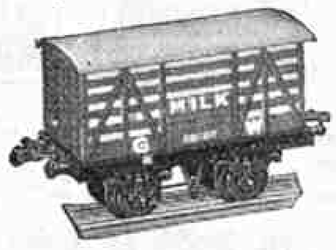
No. 2 TIMBER WAGON
Beautifully enamelled in green and red. Suitable for 2-ft. radius rails only. Price **2/6**



No. 2 SPECIAL PULLMAN COACH
As supplied with No. 2 Special and No. 3 Pullman Train Sets. This splendid coach is perfect in detail and finish. Suitable for 2-ft. radius rails only. Price **13/-**

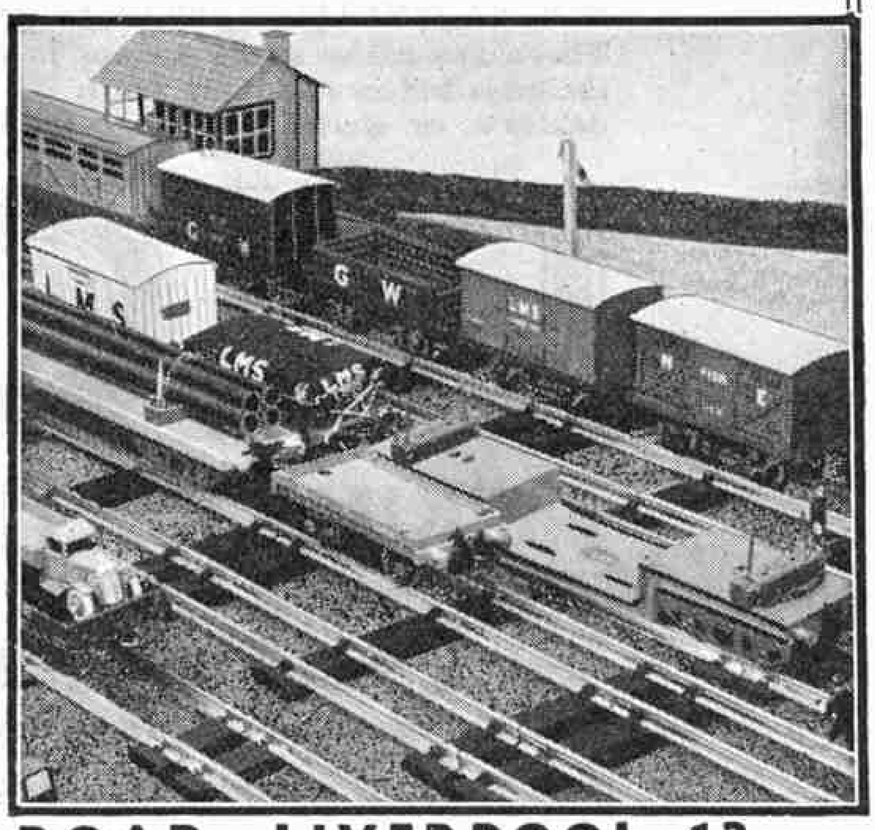


FISH VAN
This is a distinctive model. Available lettered N.E. only. Price **1/9**

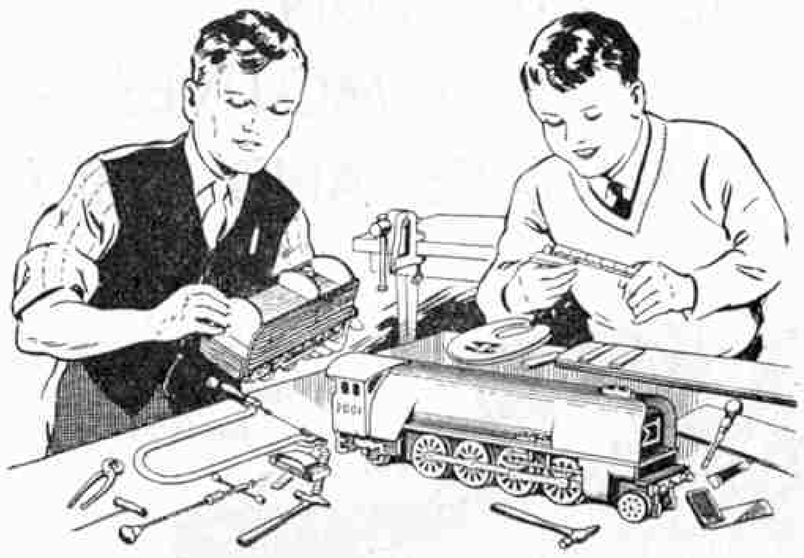


No. O MILK TRAFFIC VAN
An attractive model. Available lettered G.W. only. Price **1/9**

In L.M.S., N.E., G.W. or S.R. lettering.



Manufactured by MECCANO LTD., BINNS ROAD, LIVERPOOL 13



HOBBIES

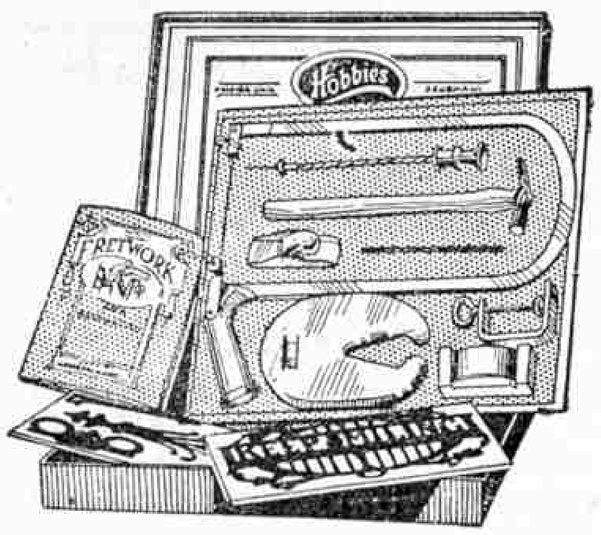
BRITISH FRETWORK OUTFITS

A hobby at which you can make pocket-money in your spare time. A Hobbies set of tools, a little wood, and design patterns and you can make models, toys, boxes, clocks, furniture, Christmas gifts, calendars, etc., etc. A jolly fine pastime you'll enjoy. Free designs with Hobbies Weekly of things to make and do.

COMPLETE SETS

from **1'6**

Each one with enough tools to make a start, complete instructions and a free simple design. Every tool reliable. The one illustrated is the National at 8'6, with wood, tools, six designs and a 64-page book of instructions. Complete in strong box.

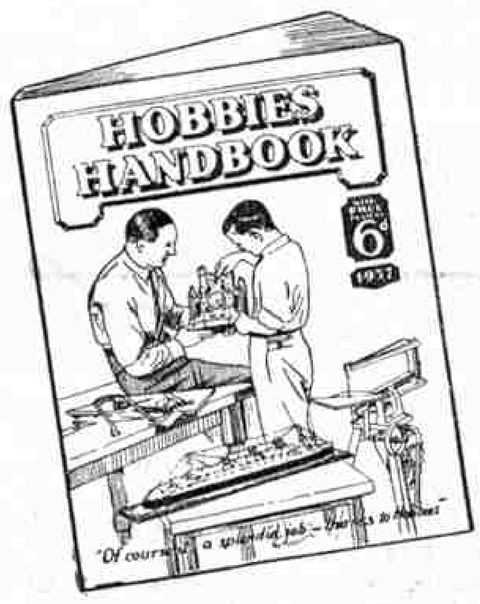


FREE LISTS

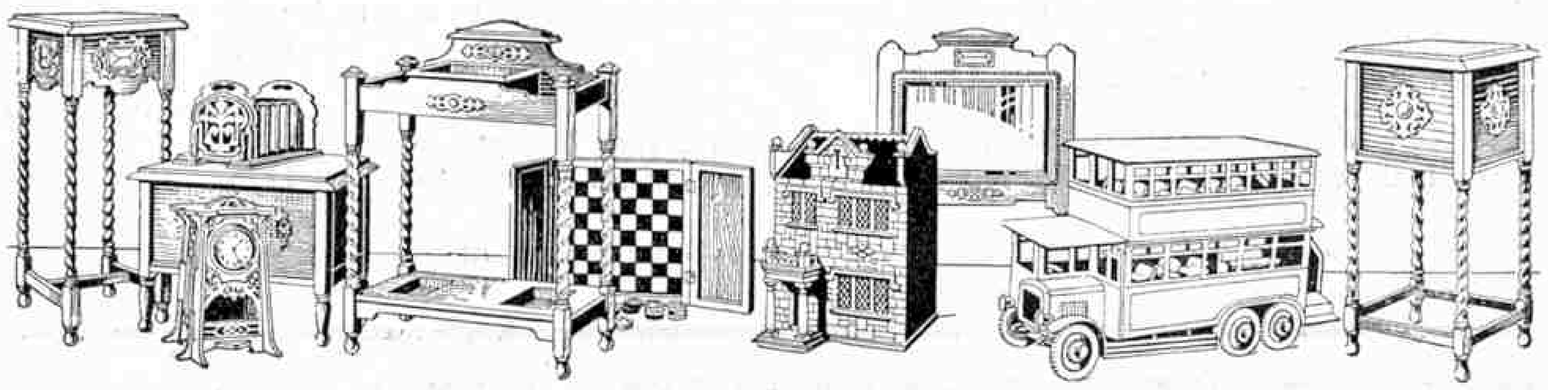
Let us send you an illustrated booklet, and a specimen copy of Hobbies free. Write to Dept. 96, HOBBIES LTD., Dereham, Norfolk, to-day.

286 PAGE BOOK AND FREE BOOK

The Hobbies 1937 Handbook deals with a dozen different pastimes, illustrates over 500 things to make and has large design charts and coloured pictures to the value of 2'6, free. Get a copy now at any newsagents, 6d. only, or send 9d. to Hobbies as below.



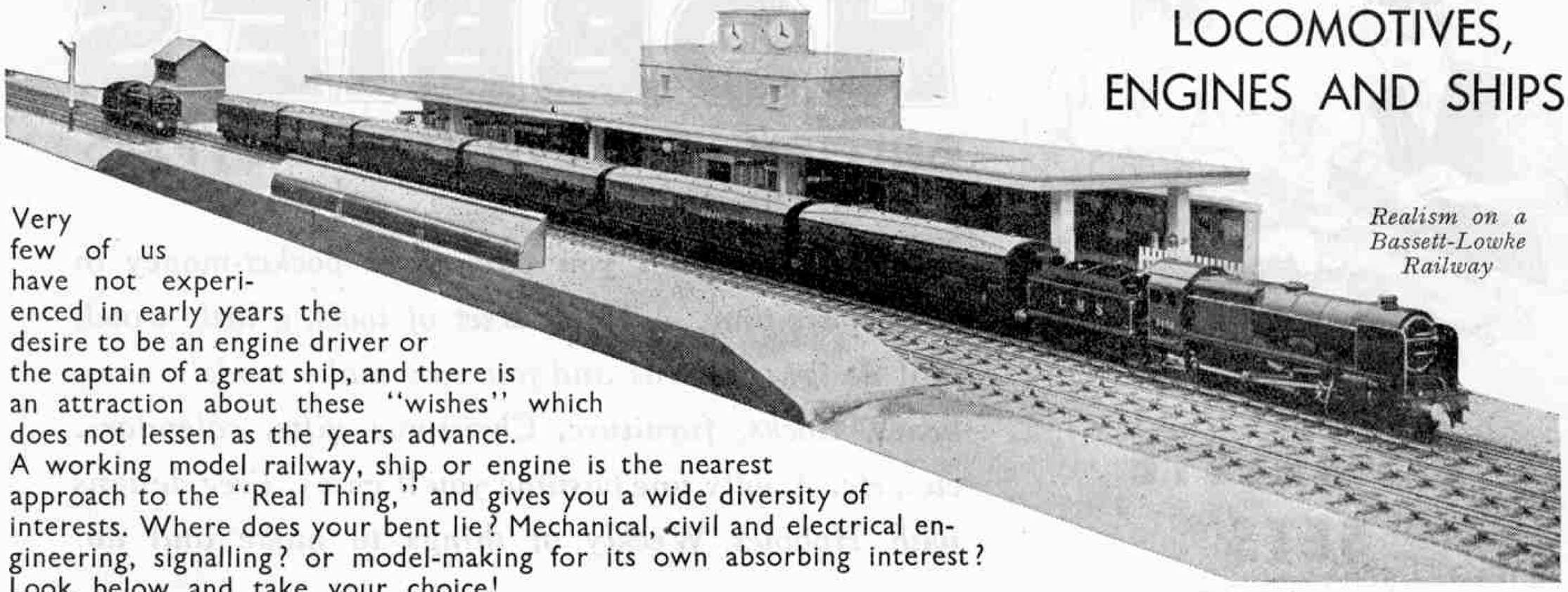
See Hobbies Outfits (ask for them by name) at all leading stores, ironmongers, and toy shops. Hobbies own Branches in London, Glasgow, Manchester, Birmingham, Sheffield, Leeds, Southampton, Brighton. Or by post, Hobbies Ltd., Dereham, Norfolk.



HOBBIES LIMITED - DEREHAM - NORFOLK

GET MODEL MINDED

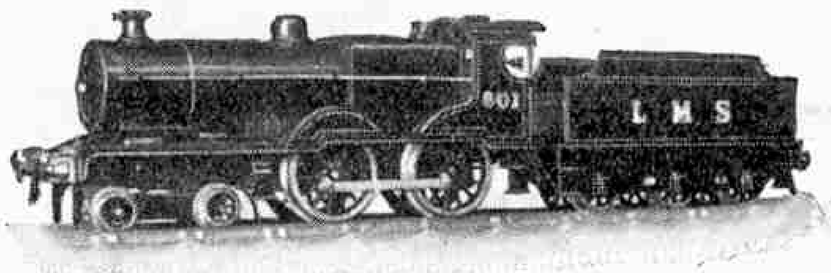
BUILD AND RUN LOCOMOTIVES, ENGINES AND SHIPS



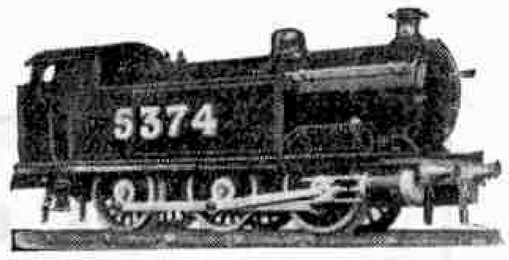
Realism on a Bassett-Lowke Railway

Very few of us have not experienced in early years the desire to be an engine driver or the captain of a great ship, and there is an attraction about these "wishes" which does not lessen as the years advance.

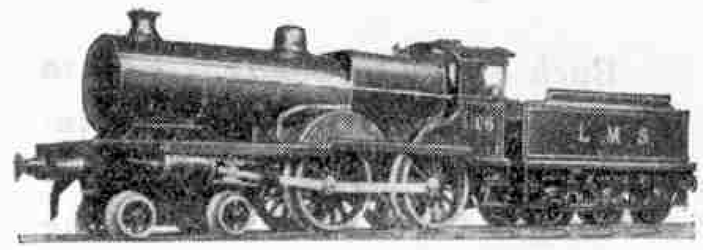
A working model railway, ship or engine is the nearest approach to the "Real Thing," and gives you a wide diversity of interests. Where does your bent lie? Mechanical, civil and electrical engineering, signalling? or model-making for its own absorbing interest? Look below and take your choice!



L.M.S. 4-4-0 Locomotive No. 601 in Gauge "O." In producing this model we had in view exactly the same purpose as the L.M.S. for its prototype—an inexpensive locomotive capable of traversing sharp curves and negotiating the difficulties of unlimited space. This handsome model costs **42/–** clockwork; **47/–** D.C. Electric, 6-8-volts; and **54/–** A.C., 20-volts.



Standard Tank Locomotive. No. 5374. Gauge "O." This smart and well-proportioned tank engine has met with well deserved success amongst model-makers. Add one to your shed this year!
Clockwork, **42/–**; D.C. electric, 6-8-volts and A.C., 20-volts, **45/–**.



L.M.S. 4-4-0 Midland Compound, No. 1103. This rebuilt model lends itself admirably to reproduction in miniature with its deep buffer-beams, raised high-sided tender and combined cab and rear driving wheel splasher. Clockwork, **32/6**; D.C. Electric, 6-8-volts, **37/–**; and A.C., 20-volts, **44/6**.

BASSETT-LOWKE BULLETIN

CATALOGUES AND BOOKLETS FOR THOSE INTERESTED IN MODELS.

A.17. Model Railways. Just newly published with new productions described, and all BASSETT-LOWKE'S well-known standard lines. Price **6d.** post free.

F.B.17. Free Booklet of most popular and inexpensive lines, chiefly railways, but also ships. Post free from Northampton.

Track Booklet on Track Laying—most useful to those extending or relaying their lines. **T.B.17.** Price **3d.** post free.

S.17. Ships Catalogue, giving details and illustrations of BASSETT-LOWKE'S wide range of ships—ancient and modern. **6d.** post free.

Souvenir Booklet of special large exhibition models executed by BASSETT-LOWKE LTD. of recent years, including the largest model made in England of the famous "Queen Mary." Ask for booklet called "Scale Models for Publicity and Exhibition," No. 17.

Fast Motor Boat "STREAMLINIA."

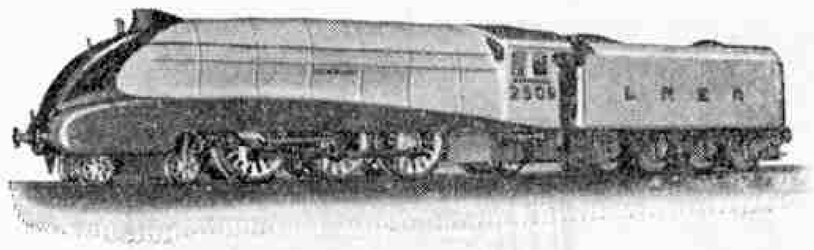
An ideal model to make up from the parts provided.

Set of parts complete with full instructions. **8 gns.**

The complete model, which under test has exceeded 7 knots. **9 gns.**

- Bassett-Lowke's new Ships Catalogue shows many new lines. Get your copy.
- Have you seen the fascinating sets of parts for building 100 ft. to the inch scale models of famous ships like the "Normandie" and "Queen Mary," complete with instructions they cost only 12/6.
- In view of their popularity Bassett-Lowke have this year brought out a 50 ft. to the inch set of parts for building the famous Clipper Ship "Cutty Sark" at 12/6.

Build one of these SUPER DETAIL Sets this winter!



L.N.E.R. Streamlined 4-6-2 Locomotive, No. 2509, "Silver Link," in Gauge "O." A splendid new model, super detail. Clockwork and electric, A.C. or D.C., **16 gns.**

NEW MODELS

Anticipating the wave of increased interest in model work now sweeping England, BASSETT-LOWKE designers have been busy during the summer erecting new railway models to interest the modern boy.

These include:

The **4-4-0 L.M.S. 2P Locomotive No. 601** and the **L.N.E.R. "Silver Link," No. 2509,** both illustrated above.

The **L.M.S. "5XP" Class "Conqueror"** in clockwork and electric, D.C., 8-volts, **£7/7/–**; A.C., 20-volts, complete with distant controller, **£8/15/–.**

The **L.M.S. 4-6-2 Express Locomotive "The Princess Elizabeth,"** in clockwork and electric, A.C. or D.C., **£8/8/–.**

The **L.N.E.R. 4-6-0 Locomotive "ARSENAL."** In clockwork or electric, A.C. or D.C. Price **£8/–/–**

And other innovations in railways, engines and ships.

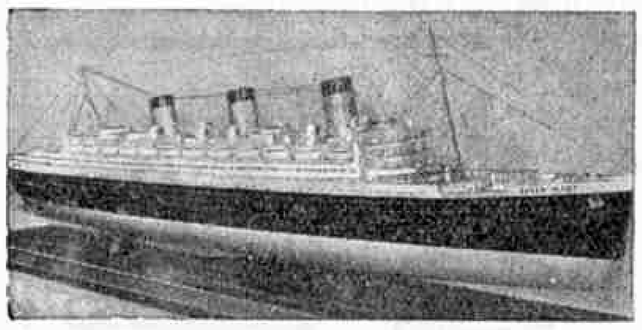
BASSETT-LOWKE LTD., NORTHAMPTON

London: 112, High Holborn, W.C.1 **Manchester: 28, Corporation Street**

BUILD THESE

SCALE MODEL SHIPS

from our complete kits



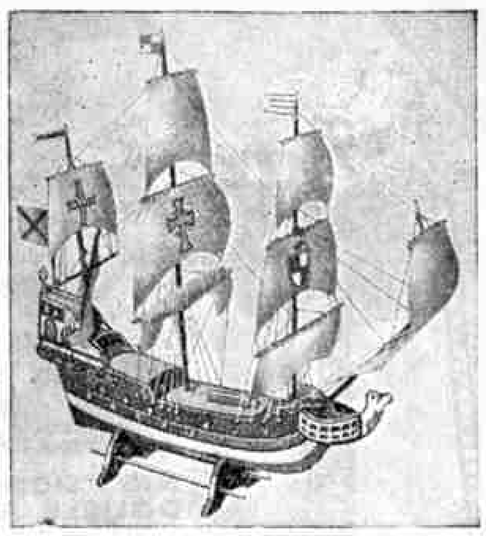
"QUEEN MARY"

Length 10 ins.

This kit makes a splendid model of the famous Cunard-White Star Liner. Kit contains everything needed, including balsa block for hull with templates, printed balsa parts for deck fittings; masts, funnels, etc. Coloured dopes for finishing, quick drying cement and clear, full-sized plan.

Carriage Paid for **3/-**

SPANISH GALLEON



The kit is very complete, including all spars, masts, deck fittings, printed designs for sails, coloured dopes, quick-drying cement, and full sized plan.

Carriage Paid for **2/-**

Send penny stamp for illustrated leaflet showing all kits, including super detail "Queen Mary," 7/6.

Send your Postal Order NOW to

M. SWEETEN LTD.

BANK HEY STREET, BLACKPOOL

SKYBIRD LEAGUE

SKYBIRDS

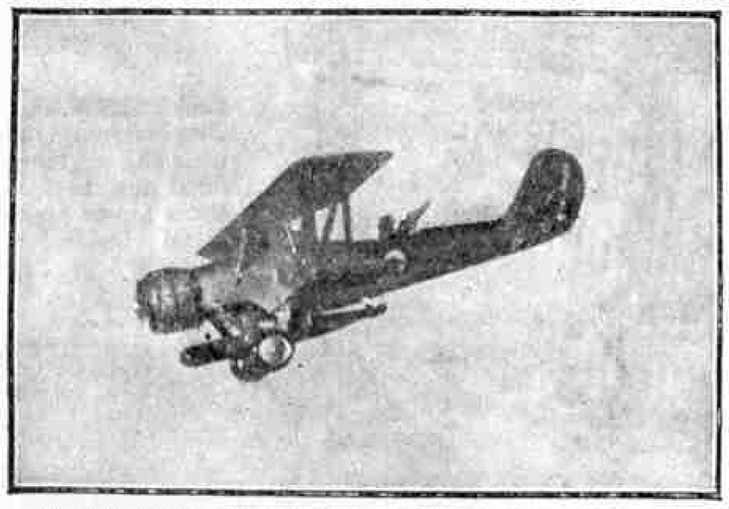
SCALE MODEL AEROPLANE CONSTRUCTION

The Hobby for all interested in Aviation, Young or Old.

A SKYBIRD Constructional Set makes a true-to-scale 1/72nd model, a perfect replica of its type. SKYBIRDS are easy to construct.

These small Models have achieved a world-wide popularity; they include well-known Civil and Military types from the Great War up to the very latest British 300 m.p.h. **FAIREY "BATTLE." Price 3/-**
There is also a large range of accessories.

Start your collection to-day. You will enjoy this Hobby.



The Blackburn "Shark" complete with cast Torpedo.

Constructional Set 4s. 6d. Assembled and painted 12s. 6d.

SKYBIRD Junior, a complete cast model of the **"CAUDRON" C460, price 1/-.**

The Latest Aircraft Refuelling Tender (3 wheels). Price 6d.

(Produced by permission of Thompson Bros. (Bilston) Ltd.

A MODEL OF GATWICK AIRPORT
Produced by permission of Airports Ltd.

MARTELLO AIR STATION, 12s. 6d.

GROUND SHEET, 7 feet by 4½ feet ... ... **10s. 6d.**

WRITE FOR A FREE PRICE LIST.

Send stamps **7d.** for a copy of "THE AERO-MODELLER," the official organ of the SKYBIRD LEAGUE, which contains full particulars of this fascinating hobby to:

A. J. HOLLADAY & Co. Ltd. (Desk B), 3, Aldermanbury Ave., London, E.C.2

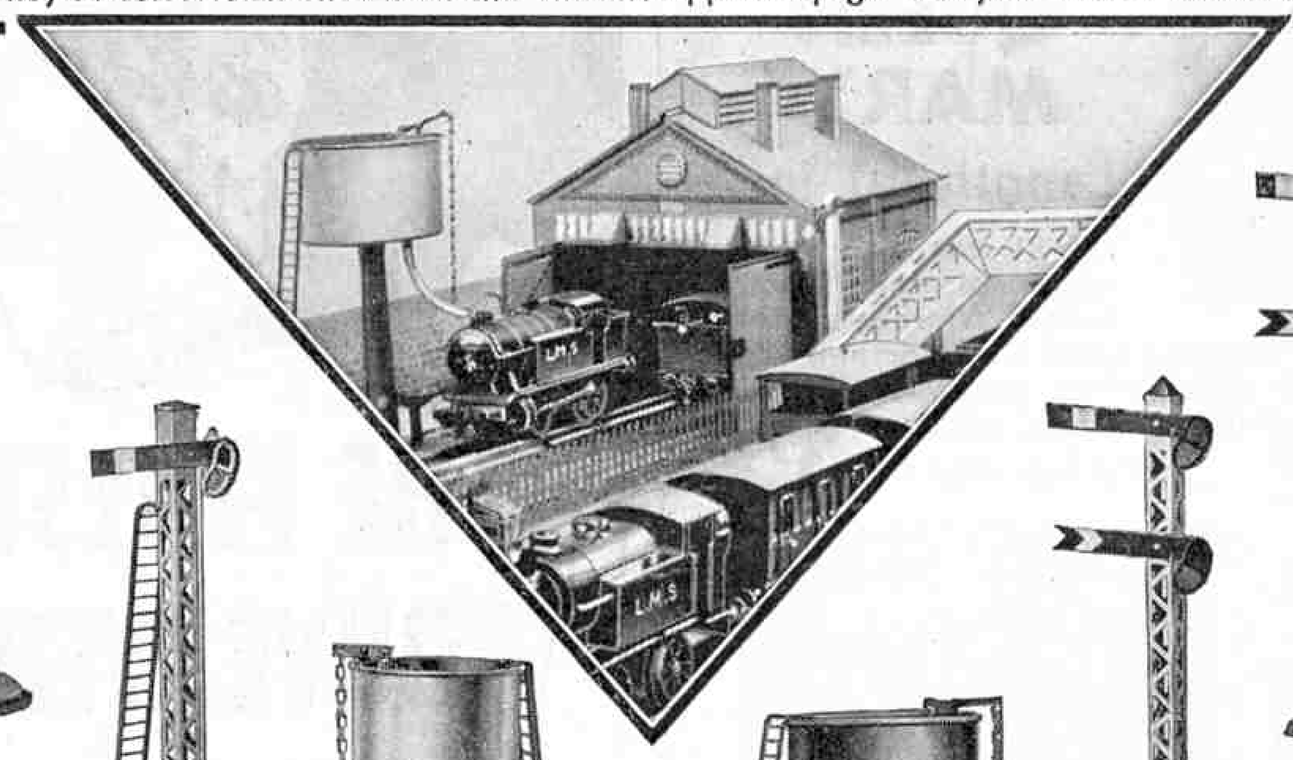
WALTERS' "PALM" TOFFEE LTD., ACTON, LONDON, W.3

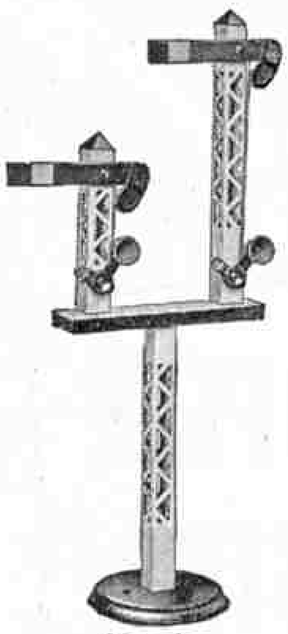
Hornby Series

HORNBY ACCESSORIES

Gauge O

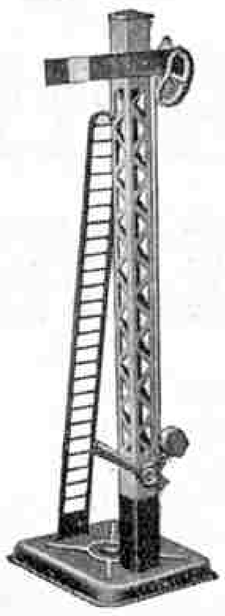
There is a splendid range of Railway Accessories in the Hornby Series, each one built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway may be constructed and operated in exactly the same manner as a real railway. A selection of Hornby Accessories is shown on this and the opposite page. Ask your dealer to show you the full range.





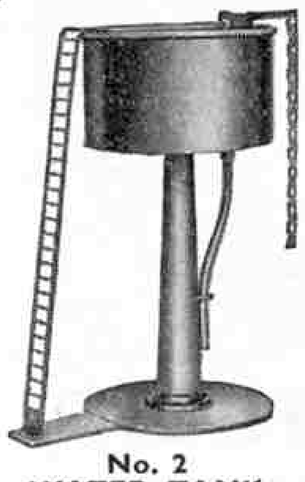
No. 1 JUNCTION SIGNAL
"Home" or "Distant."
Price 2/9

No. 1 SIGNAL
"Home" or "Distant."
Price 1/-



No. 2 SIGNAL
"Home" or "Distant."
Price 2/-

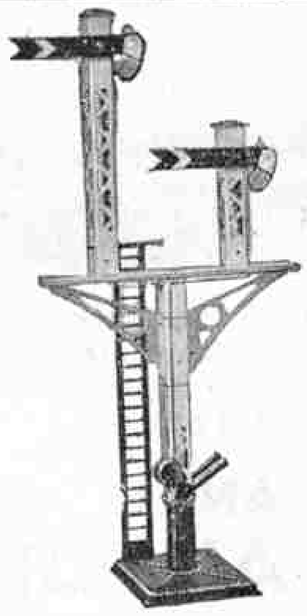
No. 1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price 3/-



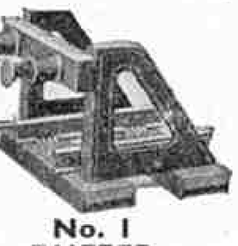
No. 2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price 5/9

No. 1 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price 1/6

No. 2 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price 2/6

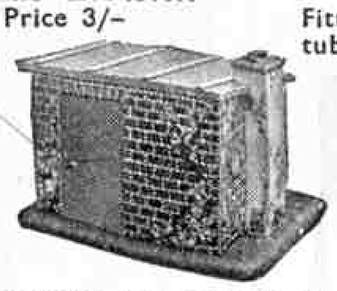


No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price 4/9



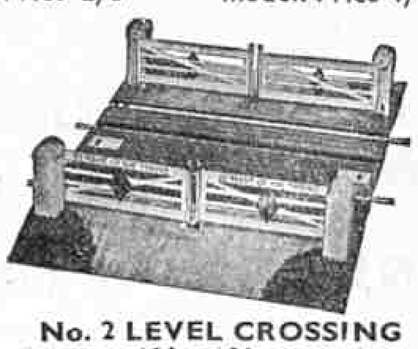
No. 1 BUFFER STOPS
(Spring type)
Price 1/-

No. 1 OILCAN
Price 6d.



PLATELAYER'S HUT
Price 1/-

No. 2 OILCAN
("K" Type). The oil is ejected drop by drop by depressing the valve. Polished copper. Price 3/6



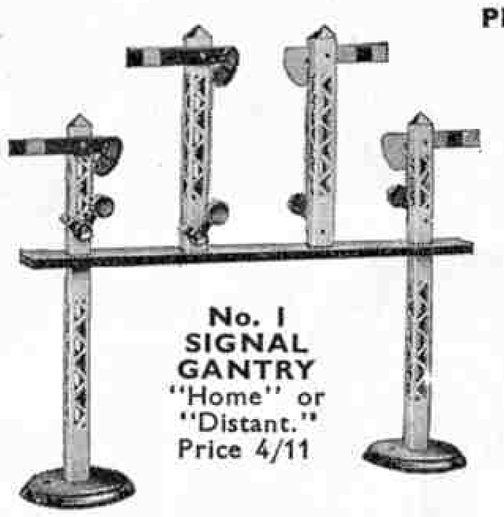
MECCANO LUBRICATING OIL
Price per bottle 6d.

No. 2 LEVEL CROSSING
Measures 13½ x 10¼ in., with two tracks of gauge O rails in position.
Price 5/6

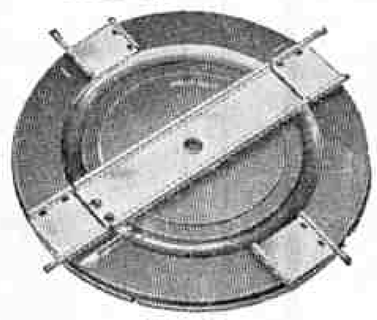
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price 7/6

No. 1 LEVEL CROSSING
Suitable for a single track only and has gauge O rails in position.
Price 2/11

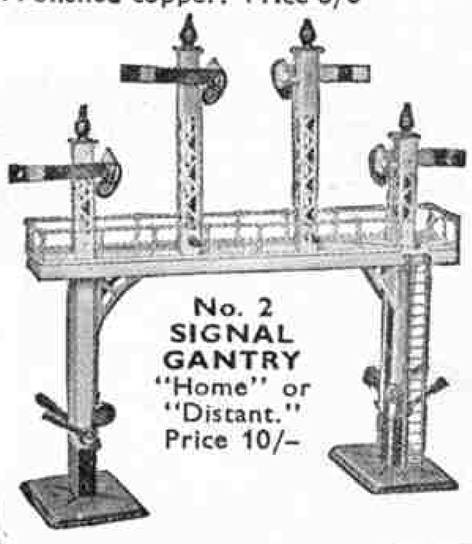
No. 1 SIGNAL CABIN
Finished in colours.
Price 2/6



No. 1 SIGNAL GANTRY
"Home" or "Distant."
Price 4/11

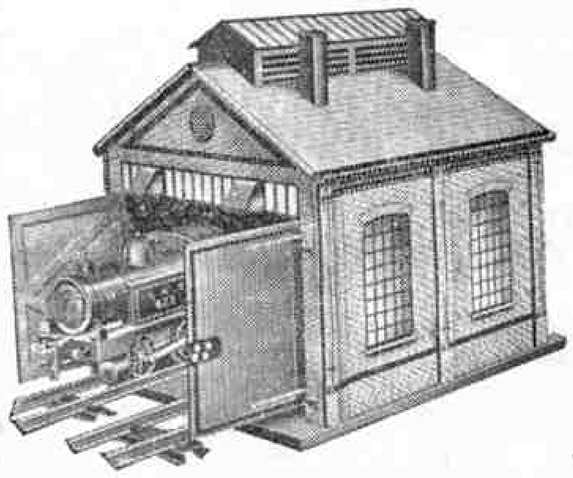


No. 1 TURNTABLE
Price 2/6

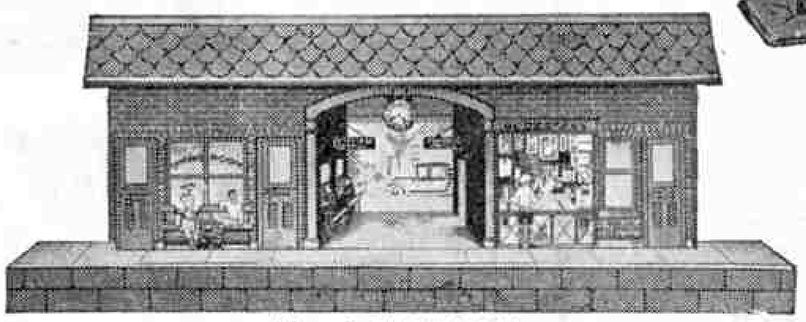


No. 2 SIGNAL GANTRY
"Home" or "Distant."
Price 10/-

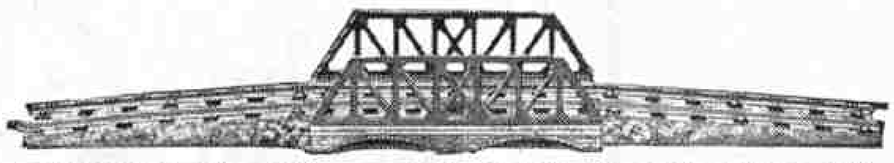
No. 2 SIGNAL CABIN
Dimensions: Height 6½ in., width 3½ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired. Price 3/9



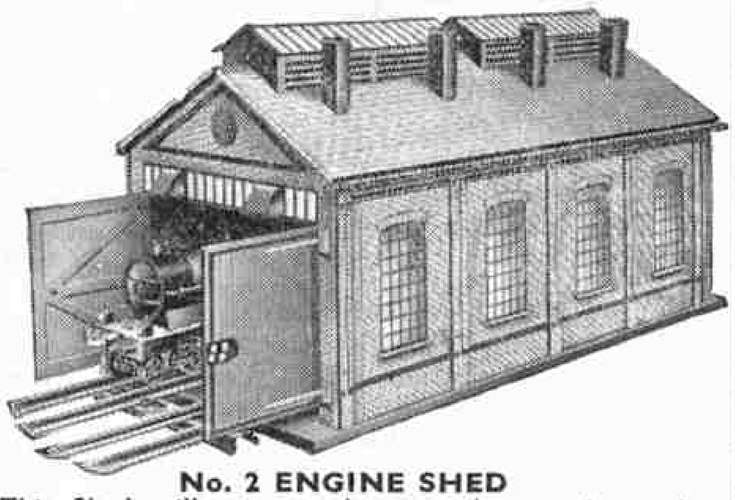
No. 1 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price 15/-



No. 1 STATION
Length 16¾ in., width 6 in., height 6 in. Price 4/6



VIADUCT Price 6/6 **VIADUCT (Electrical)** Price 7/6
VIADUCT Centre Section only... ... ... Price 4/-
VIADUCT (Electrical) Centre Section only... ... Price 4/6



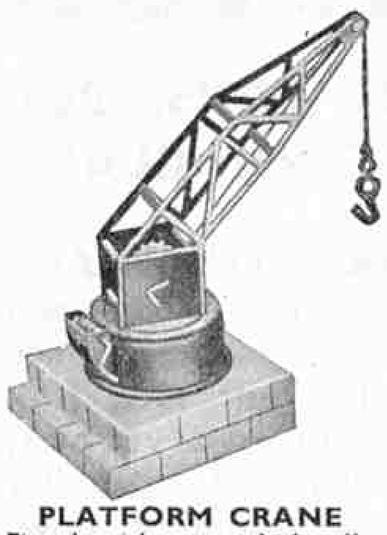
No. 2 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 17½ in.
Price 22/6

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

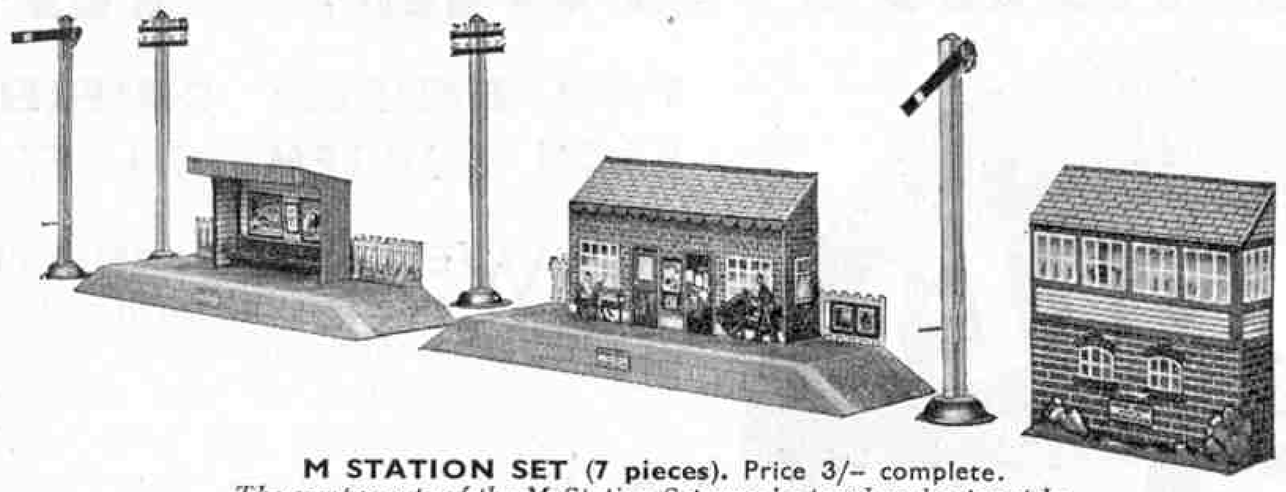
HORNBY SERIES

HORNBY ACCESSORIES

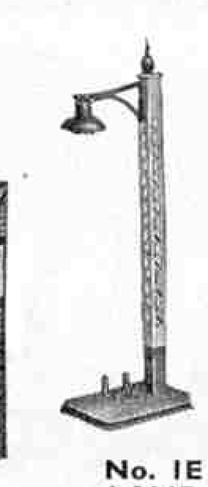
GAUGE O



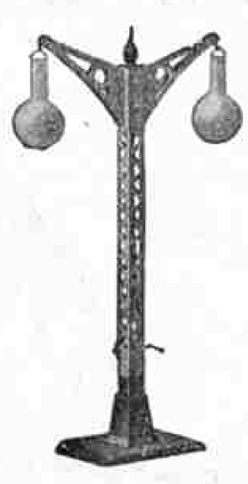
PLATFORM CRANE
Fitted with a crank handle and ratchet mechanism.
Price 3/11



M STATION SET (7 pieces). Price 3/– complete.
The components of the M Station Set may be purchased separately.
M Signal Box. Price 4d. M Signal. Price 4d. M Station. Price 1/–. M Telegraph Pole No. 1. Price 3d. M Wayside Station. Price 9d.



No. 1E LAMP STANDARD ELECTRICAL
(Single, as illustrated.)
Price 2/11

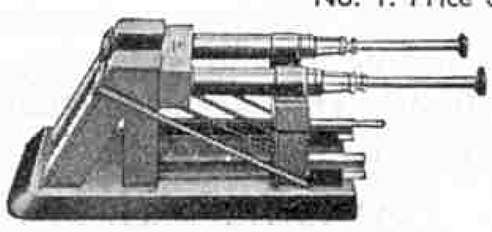


No. 1 LAMP STANDARD
(Single.)
Price 3/3

No. 2E LAMP STANDARD ELECTRICAL
(Double.)
Price 3/3

No. 2 LAMP STANDARD
(Double, as illustrated.)
Price 3/9

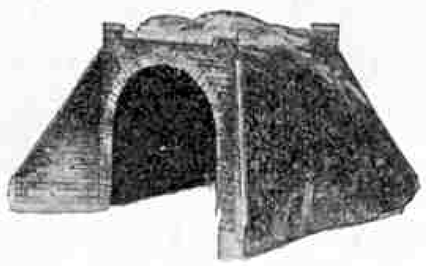
STATION HOARDING
This is a realistic accessory, suitable for the station platform. Brightly coloured.
Price 6d.



No. 2 BUFFER STOPS
(Hydraulic type.) Price 5/6

LOADING GAUGE
(Illustrated.)
Price 2/3

M LOADING GAUGE
Price 1/–

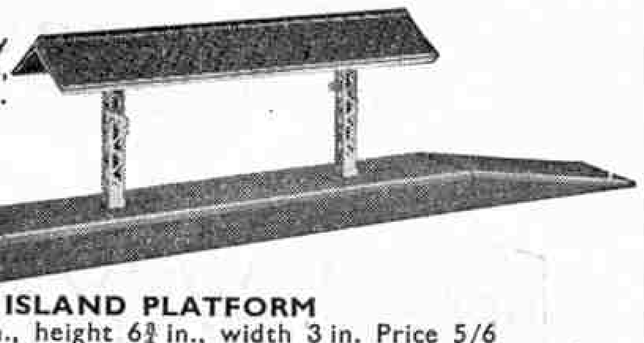


TUNNEL (Metal)
(As illustrated.)
Price 3/11

DIE-CAST SPOKED WHEELS
As fitted to Hornby Tenders, and for Wagons, etc. Price per pair 3d.

POSTERS IN MINIATURE
These Posters are beautifully printed in full colours.
1 Series. Packet of 51 Price 6d.
2 Series. Packet of 51 „ 6d.

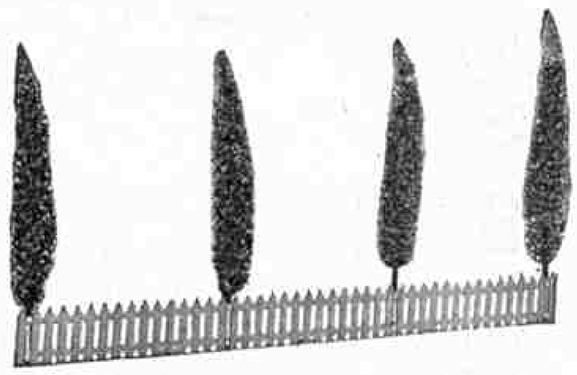
No. 1A FOOTBRIDGE
Complete with Signals. Price 4/6
No. 1 FOOTBRIDGE
Without Signals. Price 2/11



ISLAND PLATFORM
Length 32½ in., height 6¾ in., width 3 in. Price 5/6
The ramps may be purchased separately. Price, per pair, 1/9

No. 7 RAILWAY ACCESSORIES
Watchman's Hut, Brazier, Shovel and Poker. Price 10d.

No. 2 STATION
Excellent model, beautifully designed. Built up in three detachable sections.
Length 2 ft. 9 in., breadth 6 in., height 7 in. Price 8/–

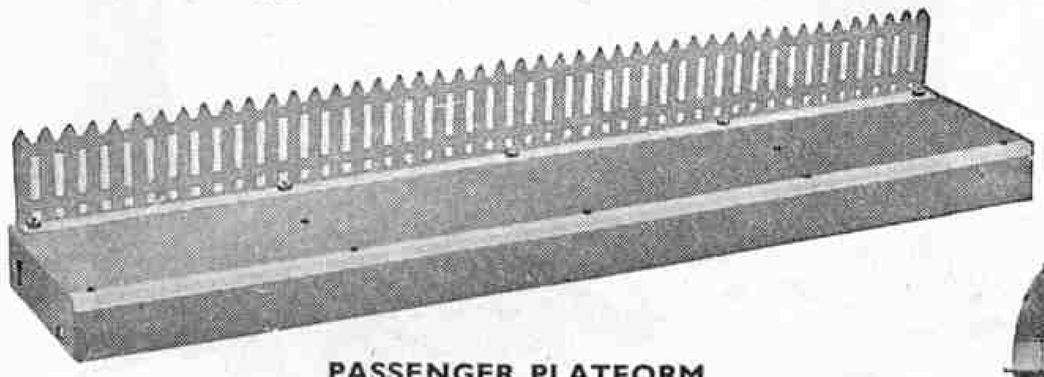


FENCING WITH FOUR TREES
Length 16½ in. The miniature trees are detachable. Price, per pair, 2/6

TREES

Trees, with Stands, assorted	per doz.	2/–
Trees, Oak, with Stands,	„	2/–
Trees, Poplar	„ „	2/–
Stands for Trees ...	„	6d.
Hedging on Base (10¼ in. lengths)	„	3/–

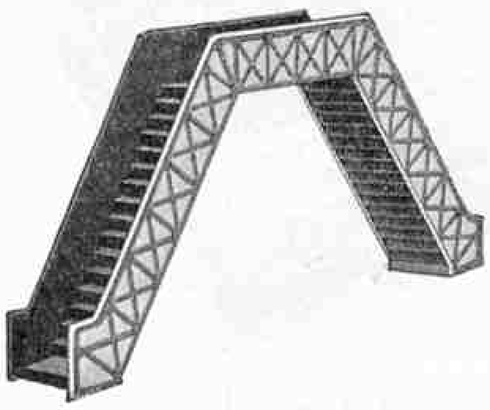
More Accessories— More Fun



PASSENGER PLATFORM
Length 16¾ in., width 3 in. This Platform may be connected to the main Station or used separately. Price 2/–
The white Paled Fencing may be purchased separately. Price per length 6d.

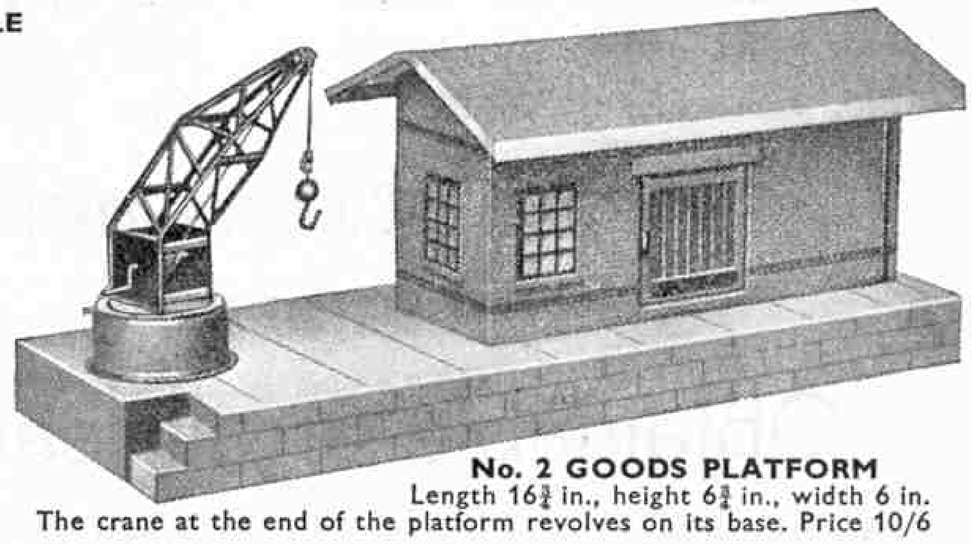
No. 2 TURNTABLE
Price 3/9

GRAPHITE GREASE
An ideal lubricant for the springs of Hornby Locomotives and Hornby Speed Boats, Meccano and Aero Clockwork Motors, and Meccano Motor Cars.
Price, per tube, 6d.



M SERIES FOOTBRIDGE
This strongly-built Footbridge is made to span a single track. Price 1/3

No. 1 GOODS PLATFORM
Length 13 in., height 6¾ in., width 6 in. Price 5/11



No. 2 GOODS PLATFORM
Length 16¾ in., height 6¾ in., width 6 in.
The crane at the end of the platform revolves on its base. Price 10/6

A BRILLIANT COMBINATION

TWO ENTIRELY DIFFERENT TOYS, BUT EACH SUPREME IN ITS OWN CLASS

This is the Standard Model.

"WEMBLEY" MINIATURE FOOTBALL transfers the thrill and excitement of the open air game into your home. You are no longer a mere spectator, for, as you manipulate your men (the players actually play with a ball, run, swerve, pass, and kick for goal), you realise that even Dad has something to learn. Tell him all about it now. "Wembley" Miniature Football will give you hours of amusement, and will make you realise that it is the finest and greatest indoor Football game in the World.

MANUFACTURED IN GREAT BRITAIN.

STANDARD MODEL	PRICES	JUNIOR MODEL
15'6		7'6

FROM "Wembley" Miniature Football we come to an old favourite. Bayko Light Constructional Sets are now famous. Thousands of children throughout the country are now Bayko enthusiasts, and with the introduction of Ornamental Sets (which include PILLARS, CAPPING, ARCHES, and COLOURED PARTS) the Standard Sets can be vastly improved.

BAYKO LIGHT CONSTRUCTIONAL SETS

BEAUTIFULLY Coloured, realistic, and to scale, Bayko Sets delight the heart of any modern child. Here is a Building Set that, while complete in itself, can be adapted to any of your present Hobbies. You can build Castles, Railway Stations, Garages, Houses, and a host of other models. You can start with the lowest priced Set, and by means of Converting Sets work up to the larger sizes.

No. 1 Set makes	36 Models	Price	**7/6**
No. 2 Set makes	60 Models	Price	**10/6**
No. 3 Set makes	120 Models	Price	**15/-**
No. 4 Set makes	300 Models	Price	**21/-**
No. 5 Set makes	600 Models	Price	**30/-**
No. 6 Set makes	700 Models	Price	**42/-**

Made throughout in Coloured Bakelite

MANUFACTURED IN GREAT BRITAIN

This is a No. 3 Bayko Set.

Obtainable at all leading Stores and Toy Dealers

or, in case of difficulty, from **BERWICK'S TOY CO. LTD., 5th. Hunter Street, LIVERPOOL, 1**

ASAS

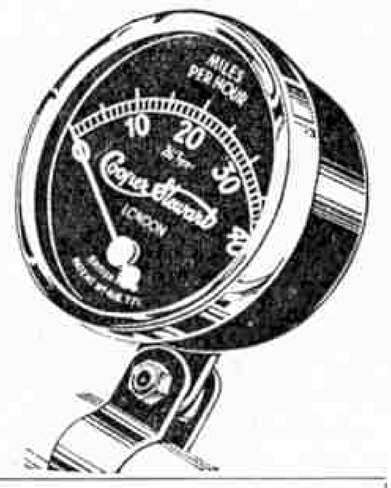
Tested by thousands of Cyclists

PROVED
a fine fitment by 2 years' rising sales

Cooper Stewart

BICYCLE SPEEDOMETER

Weight 16 oz.



Since we introduced this fascinating instrument in 1934, its constant reliability and accuracy have more than proved the soundness of its design and the sturdiness of its construction. The Cooper-Stewart Speedometer has stood the test of time!!

Stocked by Halfords, Currys, James Grose, large stores, and all good dealers, or send direct to

COOPER-STEWART ENGINEERING CO. LTD., LONDON, W.C.2

Model C.1. (Speed only.) State whether for 26" or 28" wheel **12/6**

Model C.5. (Speed and distance.) State whether right- or left-hand drive **19/6**

The NEW 1936 PORTABLE SIMPLEX TYPEWRITER

The improved TOY TYPEWRITER with sliding carriage

Prints 36 Characters on paper or card 6" wide, any length. Alphabet and numerals.

MODEL R each 6/6

With the NEW SIMPLEX PORTABLE any boy or girl can produce beautifully typed letters with the utmost ease. MODEL 'R' in looks and performance is like an expensive commercial machine. It is undoubtedly the best typewriter of its kind ever made. Types perfect letters, cards, programmes, etc.

Specimens of Characters

A B C D E F G 1 2 3 4 5 6 7

Model 100, **5**/- each. Model S, **12/6** each. 42 characters. Model T, **21**/- each. 68 Large and Small characters.

GUARANTEED FOR 2 YEARS

FROM ALL TOY DEALERS. SEND FOR LIST.

SIMPLEX TYPEWRITER CO., 1(M), Newman St., London, W.1

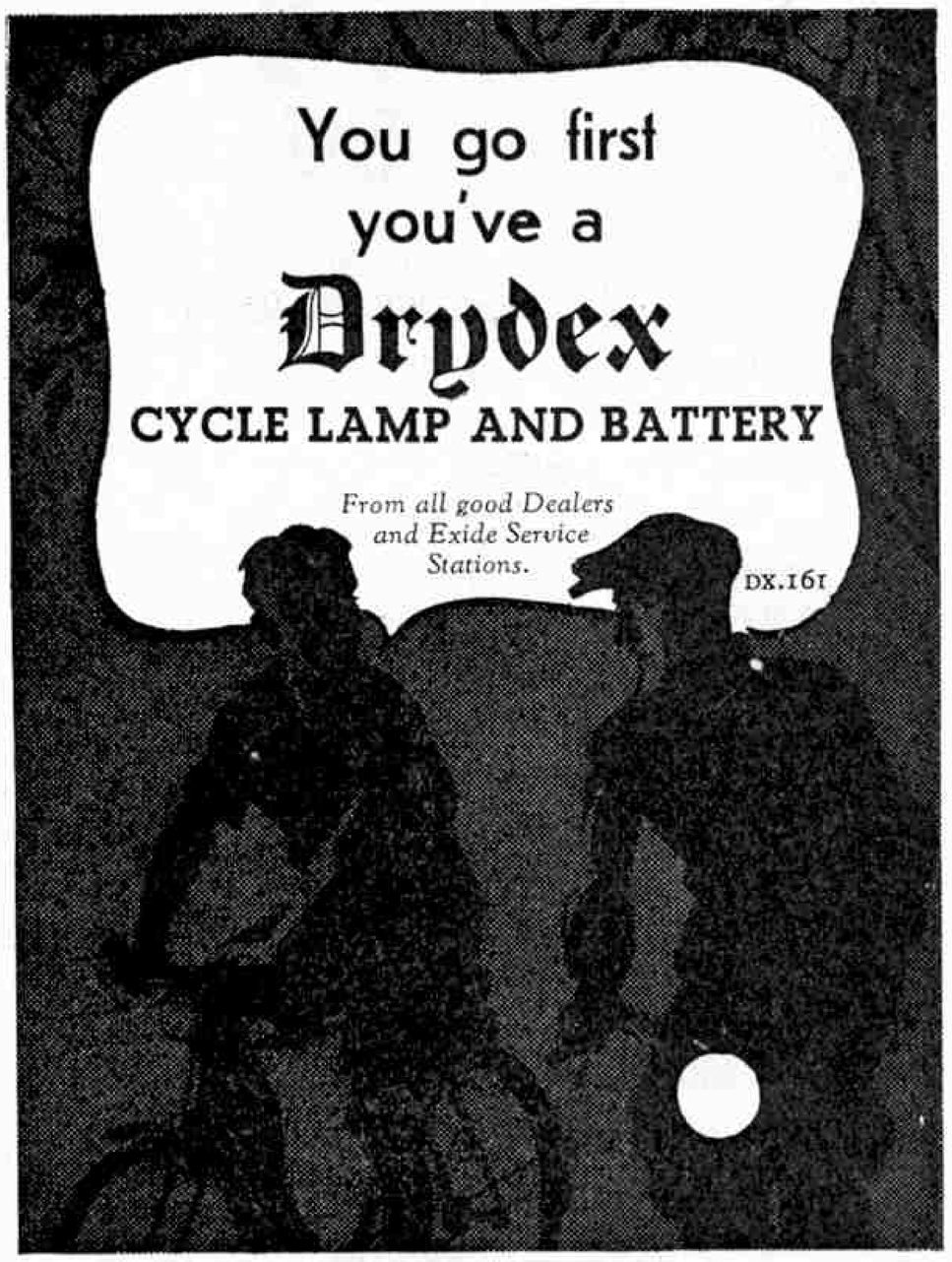
You go first you've a

Drydex

CYCLE LAMP AND BATTERY

From all good Dealers and Exide Service Stations.

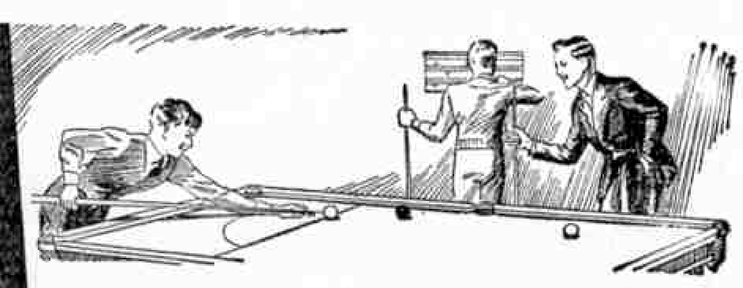
DX.161



THE HAPPY HOME PASTIME FOR WINTER EVENINGS

7 DAYS FREE TRIAL

PAY AS YOU PLAY



8/- DOWN and a Riley 'Home' Billiard Table will be delivered to your door, carriage paid, on 7 DAYS' FREE TRIAL. Think of the happy hours in store for you all at home, and how much money, now spent on other amusements, you could save. Riley 'Home' Billiard Table sizes and cash prices are:

4 ft. 4 ins. × 2 ft. 4 ins.	...	£7 0 0	OR IN 20
5 ft. 4 ins. × 2 ft. 10 ins.	...	£9 0 0	MONTHLY
6 ft. 4 ins. × 3 ft. 4 ins.	...	£11 15 0	PAYMENTS OF
7 ft. 4 ins. × 3 ft. 10 ins.	...	£15 0 0	8/-, 10/3, 13/3,
8 ft. 4 ins. × 4 ft. 4 ins.	...	£21 10 0	17/- AND 24/6.

WRITE FOR ART LIST.

E. J. RILEY Ltd., DEAL WORKS, ACCRINGTON
or Dept. 3, 147, ALDERSGATE STREET, LONDON, E.C.1.

RILEY 'COMBINE' BILLIARD and DINING TABLE

In one artistic piece of furniture quickly convertible for either use. Various attractive designs in oak or mahogany from £22 . 10 . 0 upwards, for cash or on easy terms. There is a size for every room however small.

Riley 'Cabriole' Billiard and Dining Table, 6 ft. size, £34/10/0 or 13 or 20 monthly payments.

Rileys are the largest makers of full-sized Billiard Tables in Great Britain. Also specialists in accessories, repairs.

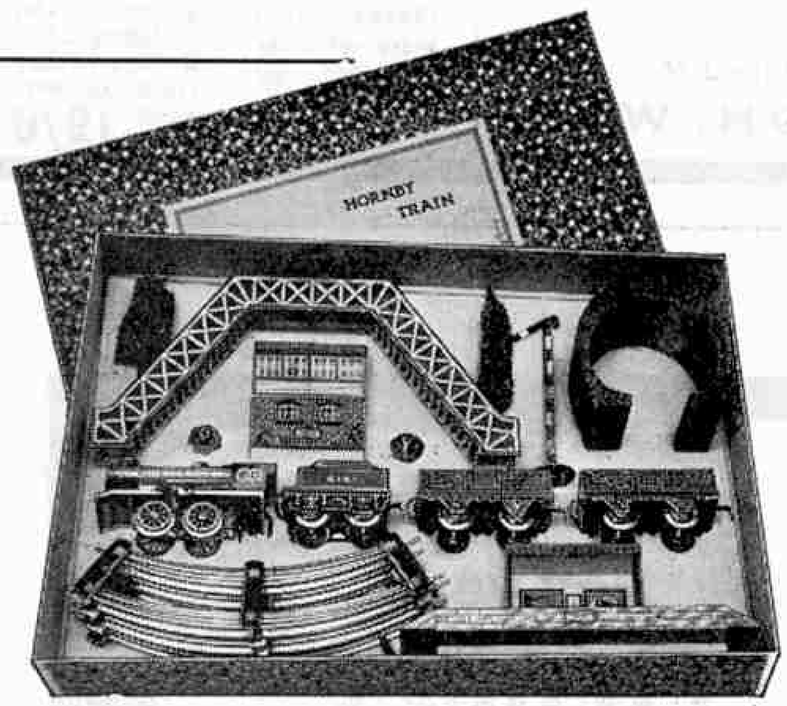
32 Free Billiard Tables. Write for details and Price List.

COMPLETE MODEL RAILWAY SETS

Right away for Happy Days!

These fine Model Railway Sets provide the simplest way of beginning the fascinating Hornby Railway hobby. Each Set is complete in itself; everything is there, ready for use as soon as you get it home.

Unpack the box, lay out the rails and accessories as shown in the illustration provided, put the locomotive and coaches or wagons on the track, and begin to run your own railway! It's the greatest fun in the world!



M8 Complete Model Railway Set

M8 Complete Model Railway

Consists of a fine non-reversing Locomotive that can be braked from the track, Tender, two Goods Wagons and Set of Rails; Wayside Station, Footbridge, a Signal and Signal Cabin, two Trees with Stands, and Tunnel. Packed in a strong carton as illustrated. Price 9/6

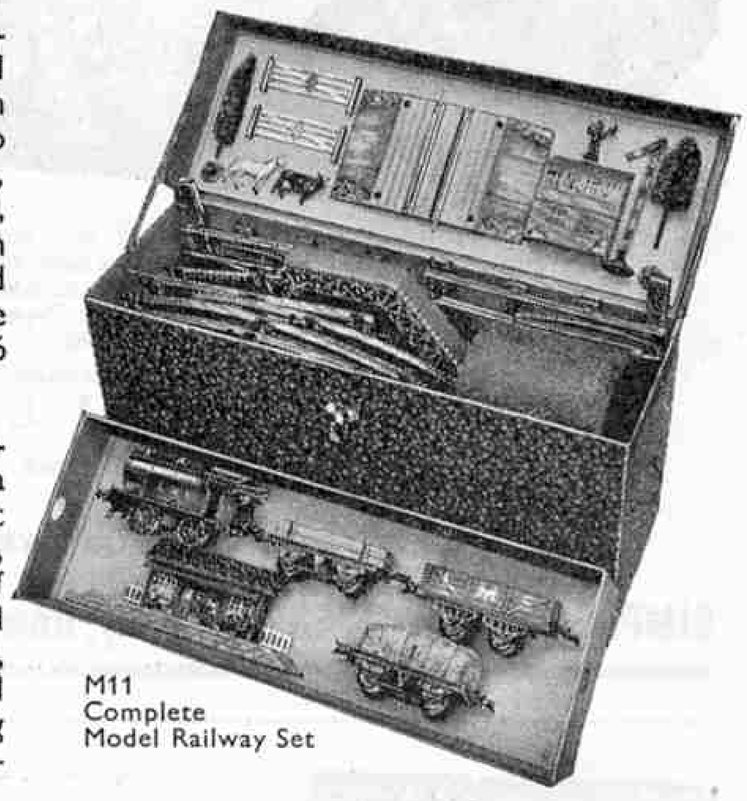
M9 Complete Model Railway

This Set includes a non-reversing Locomotive that can be braked from the track, Tender, two Passenger Coaches and Set of Rails; Station, Footbridge, Signal and Signal Cabin, Level Crossing, Guard, Porter, two Trees with Stands and two Hikers. Packed in a strong carton as illustrated. Price 12/6

M9 Complete Model Railway Set

M10 Complete Model Railway

This is a larger Set containing a non-reversing Locomotive that can be braked from the track, Tender, two Pullman Coaches and Set of Rails; Footbridge, two Stations, Signal Cabin and two Signals, two Telegraph Poles, Loading Gauge, Tunnel, Cutting, Level Crossing, three Trees with Stands, two Porters, two Hikers, Horse and Cow. The Set is packed in an attractive special cabinet as illustrated. Price 19/6

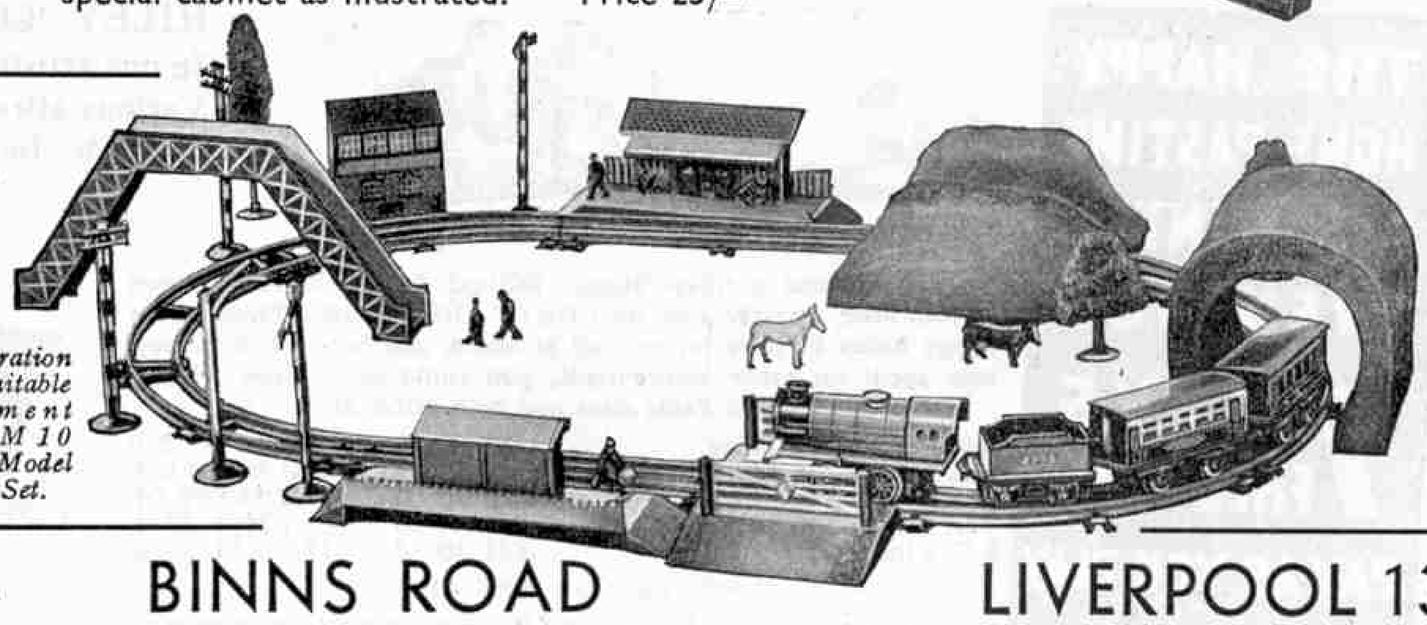


M11 Complete Model Railway Set

M11 Complete Model Railway

This is the largest and best of the Complete Model Railway Sets. It includes a powerful reversing Tank Locomotive that can be braked from the track, Fibre Wagon, Timber Wagon, Open Wagon and Set of Rails and Points; Tunnel, Station, Signal and Signal Cabin, Level Crossing, Footbridge, two Trees with Stands, Guard, one Cow and one Horse. The Set is packed in a strong special cabinet as illustrated. Price 25/–

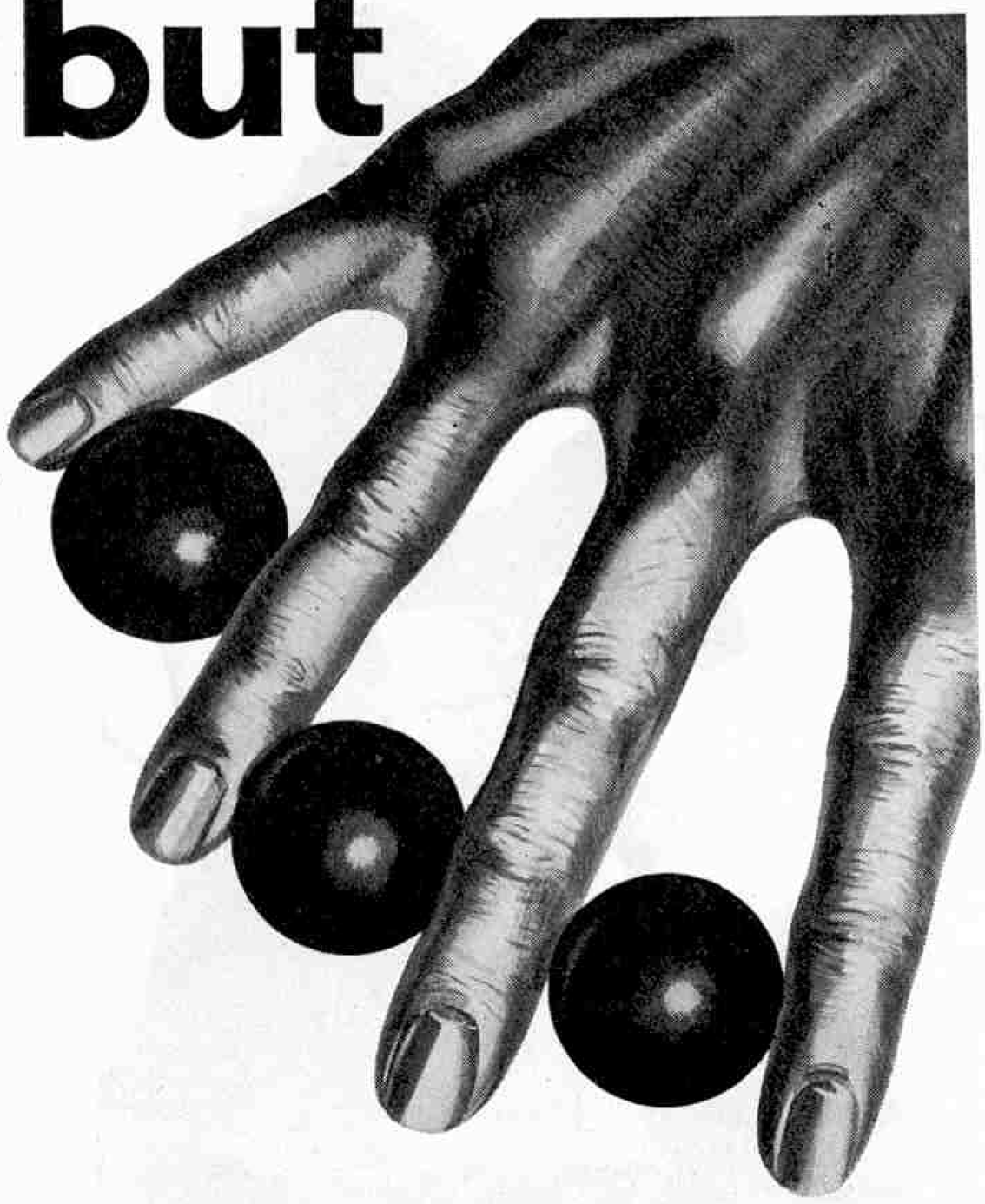
M10 Complete Model Railway Set



This illustration shows a suitable arrangement of the M10 Complete Model Railway Set.

MECCANO LIMITED — BINNS ROAD LIVERPOOL 13

but



there is no illusion about

SECCOTINE REGD.

The Double Strength ADHESIVE

The conjuror with his sleight of hand and other tricks may deceive you—but SECCOTINE won't.

For more than fifty years Seccotine has been known and accepted as the most genuinely effective adhesive procurable.

Seccotine possesses a special formula—(unchanged since 1884)—and it is this which accounts for its truly amazing adhesive qualities.

Your Grand-dad used it for making and mending articles of every kind. Follow his example and you will attain the same sound lasting results.

Remember Seccotine will make or mend articles **better** than any glue.

Sold in tubes, **4½**d., **6**d., and **9**d., by all good Stationers, Ironmongers and General Stores.

POST THIS COUPON to Dept. M

M'Caw, Stevenson & Orr Ltd., Belfast.

I should like to have, post free, copies of your Free Booklets which describe the many uses for Seccotine.

Name .....

Address .....

.....

3 great news items for boys

1 You can now be a painter and decorator as well as a builder

BUILDEC

A fine new idea that will appeal to boys of **all** ages. You build your models with uncoloured bricks and then paint them, with special Buildec paints, to any colour scheme you like. No special skill is required and the colours can be washed off for painting again and again. You can paint your railway buildings in proper company's colours and by periodical redecoration make sure they are always bright and clean.

Box 1,	plans for 12 models, 4 paints and brush	3/6
„ 2,	„ „ 24 „ 6 „ „	6/–
„ 3,	„ „ 36 „ 8 „ „	10/6

2 More realistic Tudor buildings and better value

NEW TUDOR BLOCKS

A new series of bricks with charming half-timbered designs, quaint brickwork and lattice windows, to build fascinating and realistic cottages, manors, etc., in true Tudor style. Better buildings and plans for more models!

Box 1,	18 models	2/6
„ 2,	36 „	5/–
„ 3,	54 „	7/6

and up to Box 6, 96 models **21/–**

3 Other reductions in Lott's Bricks prices

NEW REDUCED PRICES

LOTT'S BRICKS Original Series

Box O,	6 models	1/6
„ 1,	30 „	3/11
„ 2,	48 „	7/11

also larger Sets at **15/–, 21/–, 27/6**

LODOMO with windows, doors and bonded brickwork

Box 1,	18 models	3/–
„ 2,	50 „	6/6
„ 3,	72 „	10/6

AND don't forget these for the winter months

LOTT'S CHEMISTRY

A "home laboratory" with real apparatus and chemicals, **3/6, 6/–, 10/6, 42/–** and up to **105/–**. All spares for which are obtainable.

LOTT'S ELECTRICITY

Apparatus and instructions for carrying out many fascinating experiments, **6/–, 12/6** and **21/–**.

Write for lists of all Products including Chemistry Spares.

Lott's Bricks Ltd. Watford, Herts.

(1d. stamp on p.c. or 1½d. stamp on letters please.)

LOTT'S BRICKS

Hands Up...

ALL WHO WOULD LIKE A 'PLASTICINE' OUTFIT!

Wouldn't YOU like a 'Plasticine' outfit . . . wouldn't you like to be able to model characters like the one illustrated, and dozens of others besides? Then treat yourself to a 'Plasticine' Modelling Outfit for Christmas or get your Dad to get you one for a present.

- "BUILD A VILLAGE," series of six. 6d. each. Post free 8d.
- "ELFIN WONDERLAND." 2/6 per box. Post free 3/–.
- "DESIGNER," 5/6 and 12/6. Post free 6/1 and 13/5.
- "DAPADART," the dart-blowing game, 6d., 1/– and 2/6. Post free 8d., 1/3 and 3/–.

Post free rates for Great Britain; abroad extra.

This is an actual model in "Plasticine"

HARBUTT'S

Plasticine

WRITE FOR ILLUSTRATED PRICE LISTS TO:

HARBUTT'S PLASTICINE LTD., 99, BATHAMPTON, BATH

AND NOW . . . a Standard tank locomotive—built to MILBRO TRUE-TO-SCALE ACCURACY!

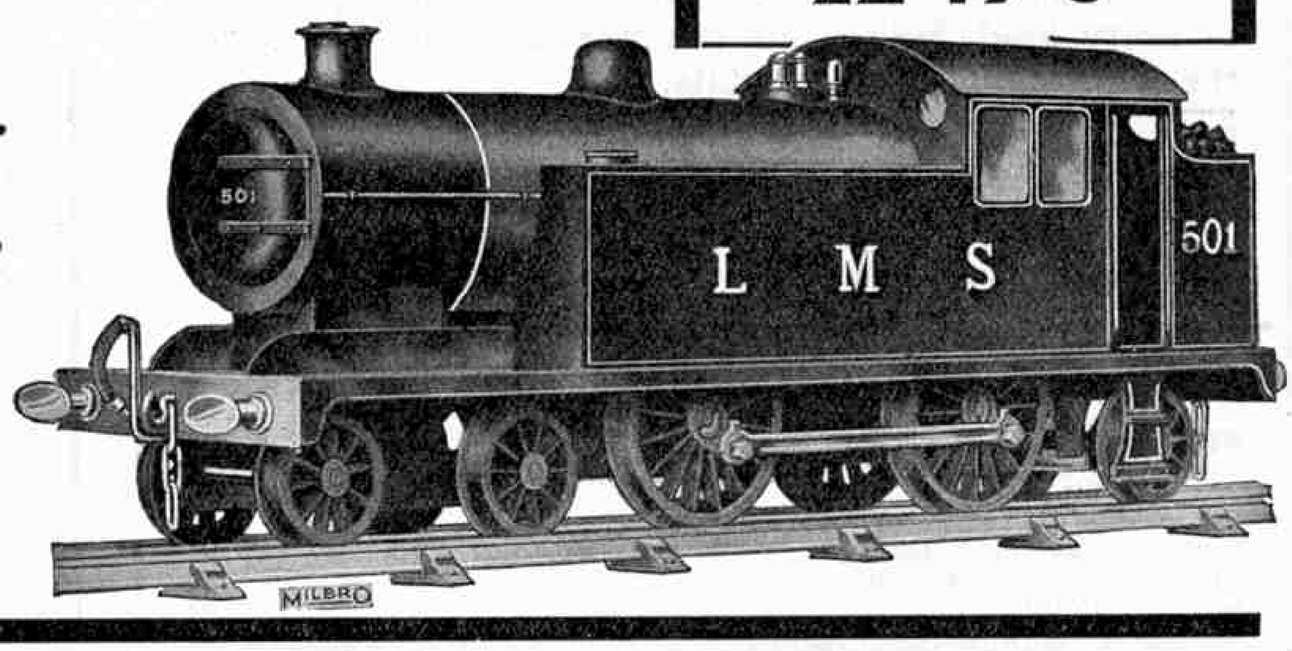
This new standard model will appeal to all those Milbro enthusiasts who have been asking continuously for an electric tank locomotive fitted with our well-known powerful mechanism, but at a cheaper price than the famous hand-made super detail models we manufacture. It must be stressed that only standardization of the body design made it possible to produce this model at its extremely moderate price. Chimneys, domes, etc., are fitted to conform to the pattern of the particular railway group the model represents. Ask your nearest Milbro dealer for a demonstration or write to us direct for full details.

All locomotives are painted and lined in the colours of the Company they represent, viz.,

L.M.S.	Maroon.
L.N.E.R.	Green.
G.W.	Green.
S.R.	Green.

They can also be supplied in All Black.

£2-19-6



MILBRO *TRUE-TO-SCALE models for reliability*

Send for your copy of the latest Milbro Catalogue, price 6d., to

MILLS BROS. (Model Engineers) LTD.
Dept. F.S., St. Mary's Road, Sheffield, 2

This magnificent model of Public Library is one of the 112 fine models built with Minibrix Set, No. 6. Note the wonderfully realistic columns and balustrades.

Build fine Models like this Public Library *yourself!*

HOW your friends will envy you when they see the splendid models you can build with MINIBRIX.

There is no end to the models that you can construct with this wonderful building system—houses, railway stations, castles, schools, churches—all looking exactly like the real thing too.

It's ever so easy to build these fine models because of the patent self-locking device that enables the all-rubber bricks and other parts to hold together, and the explanatory coloured pictures and plans in the big 48 page MINIBRIX Book.

MINIBRIX sets are obtainable from 5/– upwards. Of course, the larger the set, the bigger and the more models you can build.

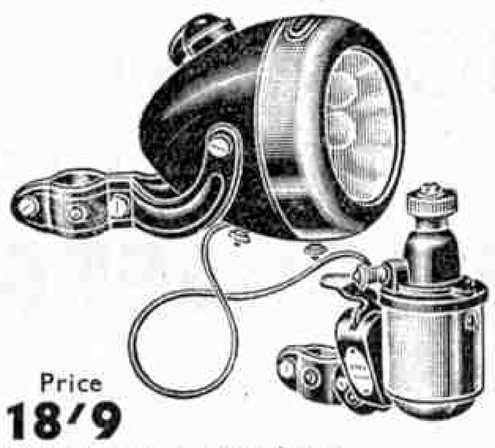
Write to Dept. M.M., PREMO RUBBER CO. LTD., Petersfield, Hants., for descriptive literature, or better still, get your MINIBRIX set right away. There's hours of grand fun waiting for the lucky boy who gets a MINIBRIX.

£100 IN PRIZES
FOR CLEVER BUILDERS
Full details of prize competition can be obtained from your dealer or direct from us.

MINIBRIX is obtainable from:
Army & Navy Stores, Gamages, Hamleys, Harrods, Selfridges, Whiteleys and most other Stores and toyshops in London and Provinces.

This Signal Box is built from a No. 2 set.

MINIBRIX
A COMPLETE BUILDING SYSTEM IN MINIATURE
WITH *All-rubber* SELF LOCKING BRICKS
PREMO RUBBER COMPANY LIMITED, PETERSFIELD, HANTS.



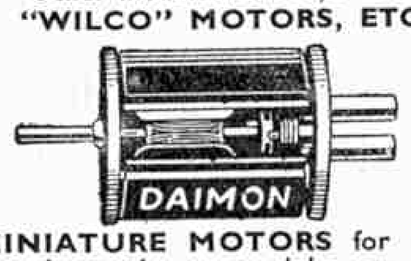
BE THE ENVY OF YOUR PALS

by fitting this "WILCO" dynamo set on your cycle. Brilliant lighting and lasting service has made "WILCO" sets the favourite with thousands of cyclists. The 6-volt Chromium-Plated Dynamo has ball bearings and automatic voltage regulation which guarantees a powerful and penetrating beam at all speeds. The headlamp has a large Chromium front and black streamlined body. The twin bulbs operate either from the dynamo or battery controlled from a rotary switch. A special stem fixing bracket forms guard against theft and a neat and efficient rear lamp is included in the set.

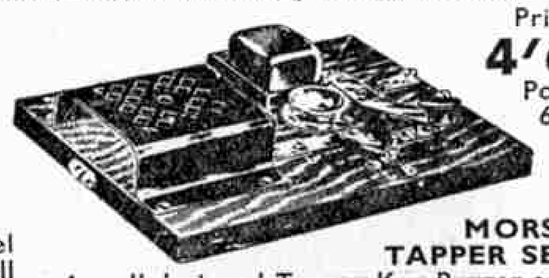
Price **18/9** Complete with rear lamp.

Other models from 13/9 to 27/– are described in Leaflet, free on request.

"WILCO" MOTORS, ETC.

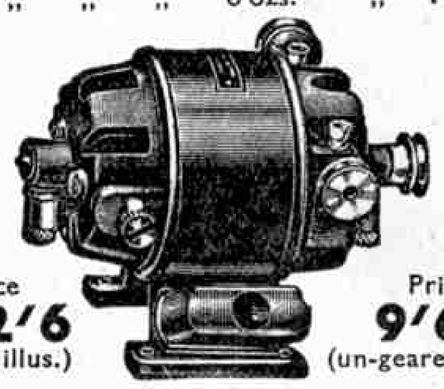


MINIATURE MOTORS for model aeroplanes, boats, models, etc. Well constructed. Lightweight.
3-Volt model, weight 1½ ozs. Price 5/6
4.5 „ „ „ 3 ozs. „ 7/6



Price **4/6** Post 6d.

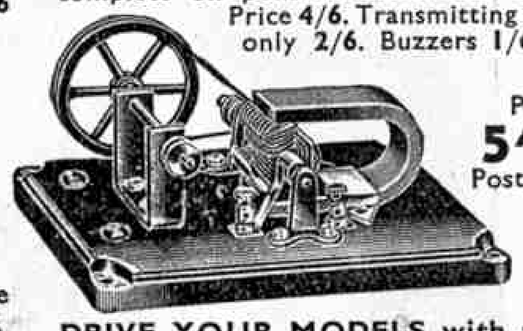
MORSE TAPPER SET
A well-designed Tapper Key Buzzer and battery container with flash lamp bulb complete on polished hardwood base. Price 4/6. Transmitting key only 2/6. Buzzers 1/6.



Price **12/6** (as illus.)

Price **9/6** (un-geared)

IRONCLAD GEARED MOTOR. 4-6-volt. This fine motor is very powerful indeed and will work off A.C. mains through a "Wilco" Transformer.



Price **5/6** Post 6d.

DRIVE YOUR MODELS with this New Powerful "Wilco" Permanent Magnet Motor. Fitted with toothed gear wheel. Special gearing gives increased power and allows heavy models to be worked. Motor works perfectly off 4-v. Battery or Accumulator.

Leaflets of Cycle Sets free on request or Complete Catalogue "M.M." 3d. post free. "Wilco" goods obtainable from all Dealers; if any difficulty order direct from:
L. WILKINSON, "Electric House," 204, Lower Addiscombe Road, Croydon.

WHY NOT A NAVY WEEK—AT HOME!

SHIPSERIES

Constructive Water-line Models. Scale: 100 ft. = 1 in.

All types of the Royal Navy are represented, HOOD, NELSON, AIRCRAFT CARRIERS, CRUISERS, DESTROYERS, SUBMARINES, with metal cast GUNS, TURRETS, etc. Also SHIPS of the MERCHANT NAVY—The QUEEN MARY, AQUITANIA, EMPRESS OF BRITAIN, CROSS CHANNEL and CARGO STEAMERS, OIL TANKER, TUGS, LIGHTSHIPS, LIGHTHOUSES, FLYING BOAT, DOCKS, CRANES and many other accessories.

SHIPSERIES LEAGUE

JOIN THE SHIPSERIES LEAGUE
For list and address of nearest agent write:
A. J. HOLLADAY & Co. Ltd. (Desk B)
3, Aldermanbury Avenue, LONDON, E.C.2

Build your own engine

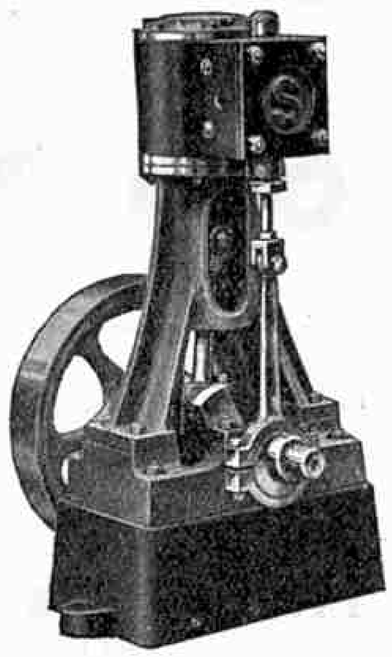
Only a few hand tools required.

Stuart No. 10.
Completely machined set with full instructions:
from **18/6** post free.

All our sets from 5/– upwards, illustrated and described in our No. 2 catalogue, 6d. post free.

72 pages fully illustrated.

STUART TURNER LTD.
Henley-on-Thames



TO ALL WHO MAKE MODELS, or possess them,

THOMAS DE LA RUE & CO. LTD. ANNOUNCE THEIR NEW

MODEL ENGINEER'S POCKET DIARY

Mr. Percival Marshall, A.M.I.C.E., has himself specially compiled the information supplement, which is packed with pictures, and gives details of all museums where models are to be seen, and lists of all clubs, flying grounds, etc., with pages of useful figures and tables for the model maker. There has never been anything like it before.

THE DIARY ITSELF:

Is as slim as a fifty guinea watch
and supple enough to curl up in a circle.

Bound in a soft Persian leather—a delight to sensitive fingers. Indexed by months and alphabetically for extreme handiness.

Its slight weight—1½ ozs.—gives no idea of all the good that's in it. Price **3**/– (or **3**/**6** with fine pencil).

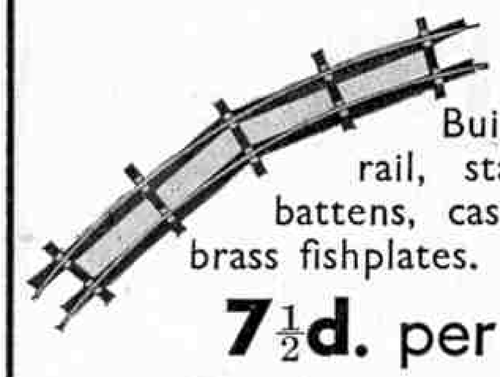
Other Diaries in this Series available for:

ART COLLECTORS; ARTISTS; ATHLETES; CIVIL ENGINEERS; ELECTRICAL ENGINEERS; GARDENERS; MECHANICAL ENGINEERS; MOTORISTS; BUSINESS MEN; STAMP COLLECTORS; YACHTSMEN.

STOCKED BY

W. H. SMITH & SON LTD. everywhere, BOOTS (Chemists), all leading LONDON STORES, and by all PROGRESSIVE STATIONERS in whose window this sign (black on a red triangle) appears:

ASK HERE FOR DE LA RUE'S OCCUPATIONAL DIARIES



METALWAY

Built from solid drawn steel rail, stained wood sleepers and battens, cast super detail chairs, and brass fishplates.

7½d. per **18"** length

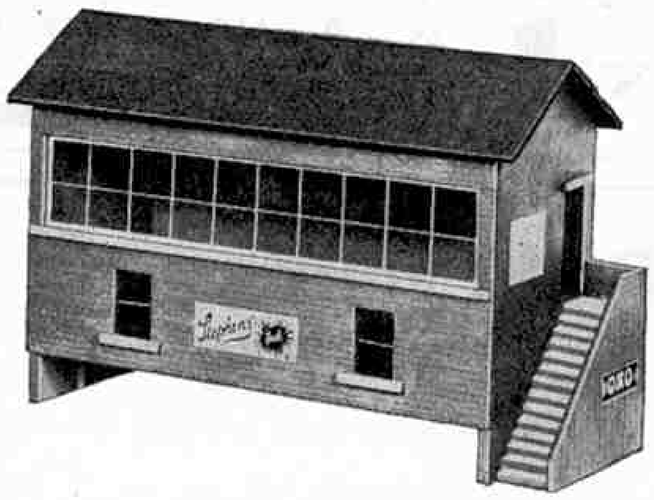
POINTS & CROSSOVERS, VARYING RADII

from 4/9

SIGNAL CABIN

10½" x 5½"

6/6



This coupon entitles you to a free illustrated leaflet. Fill in your name and address and post to-day.

Name .....

Address .....

.....

THE LEEDS MODEL CO. LTD.

POTTERDALE MILLS, LEEDS, 11

Choose your Christmas Present NOW!

Join a Meccano Christmas Club now if you wish to make certain of being the proud possessor of the Meccano Outfit, Hornby Train or other Meccano Product that you are so keen on. All you have to do is to visit your local dealer and ask him to enrol you in his Club. Nearly every Meccano dealer runs a Christmas Club Scheme, so that you are not likely to meet with difficulty in this direction. You pay a small sum weekly, and this is entered by your dealer on a special Christmas Club Card that he gives you. Then, when Christmas comes, you will have the excitement and pleasure of collecting the present you have bought yourself!

MAKE YOUR CHOICE FROM THIS LIST

Meccano Outfits
Hornby Trains
Aeroplane Outfits
Motor Car Outfits
"Dolly Varden" Doll's House
Dinky Toys
Dinky Builder Outfits
Hornby Speed Boats and Racers
Kemex Chemical Outfits
Elektron Electrical Outfits

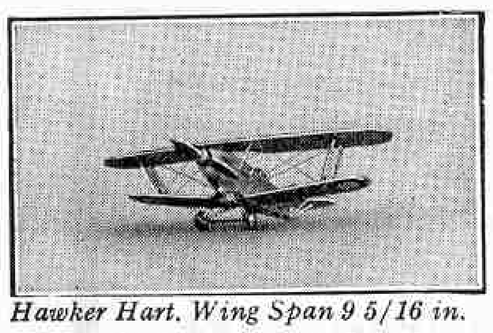
JOIN A MECCANO CHRISTMAS CLUB

Meccano Ltd. - Binns Road - Liverpool 13

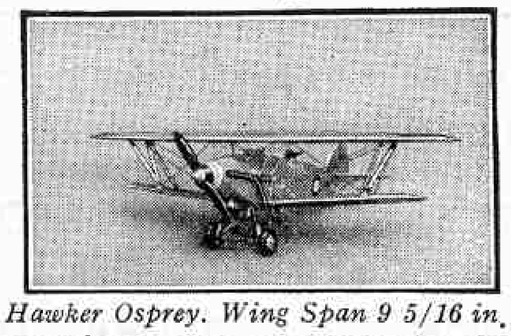
Announcing . . .

AEROMINORS

MODEL AIRCRAFT CONSTRUCTION SETS $\frac{1}{48}$th Full Size



Hawker Hart. Wing Span 9 5/16 in.



Hawker Osprey. Wing Span 9 5/16 in.

The wing surfaces, fuselage coverings, etc., are accurately designed and printed on sheets of special quality card. All internal stiffening is of balsa wood.
Wheels, propeller parts, etc., are supplied ready-shaped in wood. Tail-planes, also rudders and fins are made from thin plywood, struts and undercarriages of wire. Glue pins, cane, thread for rigging, celluloid, plywood, balsa wood, printed shapes, etc., are all supplied. A very complete illustrated Instruction Sheet is supplied. No special tools or skill are required for making these perfect little scale models.

KIT No. 2
Either the "Moth Major" or the "Tiger Moth" may be made from this set. **READY SOON.** Price **2/6**

KIT No. 3
Either the "Fury" or "Nimrod" may be made from this set. **READY SOON.** Price **2/6**

Send 1½d. stamp for fully illustrated and descriptive lists containing full particulars of the above; also our well-known large scale AEROMODEL KITS (1/24th SCALE), built-up models, general arrangement plans, etc.

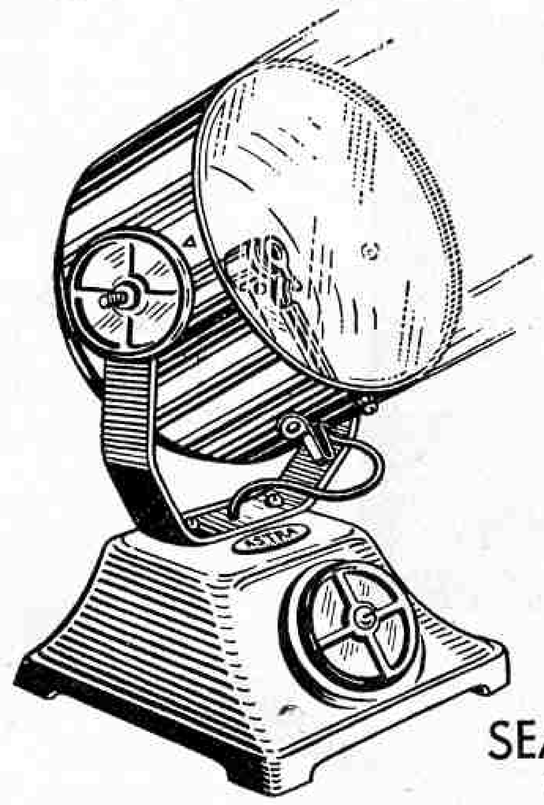
If you cannot obtain Aerominors from your Local Dealer send your Postal Order direct to:

AEROMODELS LTD.,
No. 5 First Floor, Wellington Building, The Strand, Liverpool 2.

KIT No. 1
The
HAWKER "HART"
Series. Now ready.
Price **3/-**
Postage Abroad 1/– extra
This set contains full instructions and all materials (except paint) for making any one of the following types: "Hart," "Hind," "Audax," "Demon" or "Osprey,"

ASTRA
ELECTRICAL TOYS

Are on Show at your Local Dealers *from* **1/6** *to* **21/-**

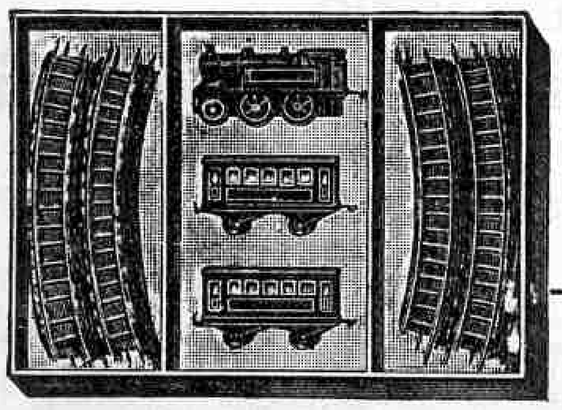


Traffic Signals, 2/11, 3/9, 4/11; Motor Ramp, 1/11; Garages, 3/11, 5/6, 12/6, 21/–; Model Harbour, 5/11; Pierhead, 5/11; Lighthouse, 3/11; Water-line Set, 2/6; Searchlights, 3/11, 5/6, 10/6; Flood-light, 1/6; Morse Set, 12/6; Petrol Pump, 3/6; Display Board, 37/6.

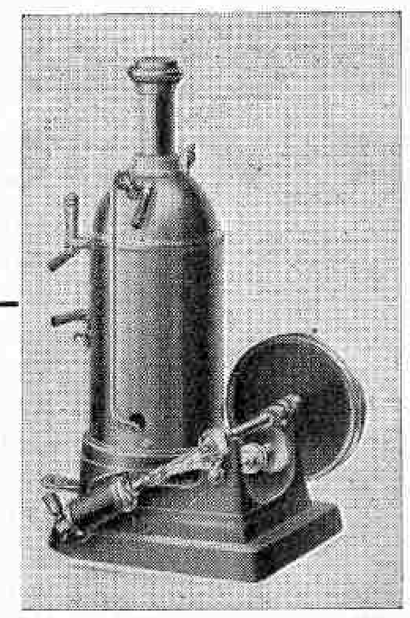
SUPER SEARCHLIGHT **10/6**
THE BEAM CAN BE SEEN FOR MILES

Sole Concessionaires:

PERCY GOODWIN LTD.
80, WOOD STREET, LONDON, E.C.2



BOND'S
Special Christmas Bargains



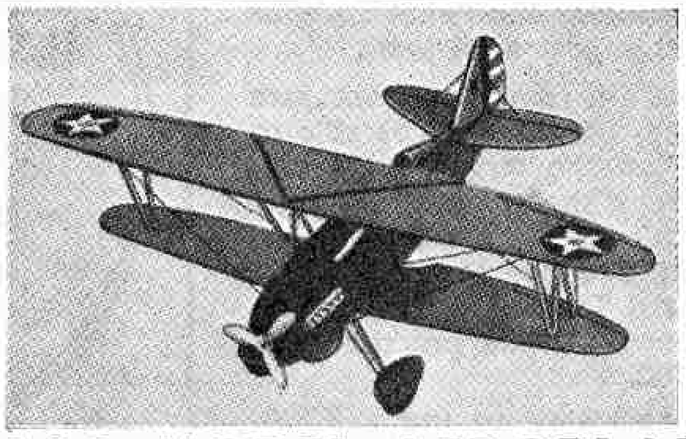
Miniature Table Top Railways

Clockwork Train Sets having loco, 2 coaches and circle of rail. Price 8/–. Postage 7d.

Electric Set having loco, 3 coaches and oval of rail. Price **25/6**. Postage 8d.

SEPARATE PARTS	Clockwork	Electric
Tank Locomotive, Red, Green ...	4/9	11/–
Passenger Coach, L.N.E.R., L.M.S.	8d.	8d.
Signals	6d.	6d.
Telegraph Pole	3d.	3d.
Reverse Trip for Electric Locomotive	—	4d.
Railway Station with long platform	1/6	1/6
Siding Buffer Stop	9d.	9d.
Signal Cabin	10d.	10d.
Tunnel	11d.	11d.
Rails (straight), 7¼ in. long... ...	6d. dozen	5d. each
Rails (curved), 12 to circle ...	2/– dozen	5d. each
Point Turnout to R.H. and L.H., 7½ in. long	1/9	4/6
Crossing (Scissor)	6d.	2/3
Rail with Regulating Resistance ...	—	4/6
Brake Rail for Clockwork Loco ...	4d.	—

Postage extra.



BALSA MODEL AEROPLANES

REAL FLYERS

We are offering the finest American Kits of parts ever put on the market for the Model Aeroplane Builder. All kits are complete including all Balsa wood, Japanese tissue, wheels, pins, wire, elastic and full-size Drawing with instructions.

PRICES

Kits for 26" wing span flying model of the Fokker D8, Niewport XVII-CI Rearwin Speedster, Fairchild 22, Monocoupe 90A, Ryan Low Wing, Stearman, Curtiss Hawk. Price per Kit **2/6**, postage 4d. Super Kits for building up 24" wing span models which can be fully controlled from the cockpit, everything wanted is included in these Kits to make a Stinson Reliant, Curtiss Swift, Albatross D-5A, Spad, Hell Diver, Douglas 0.38. Price per Kit **7/6**, postage 6d.

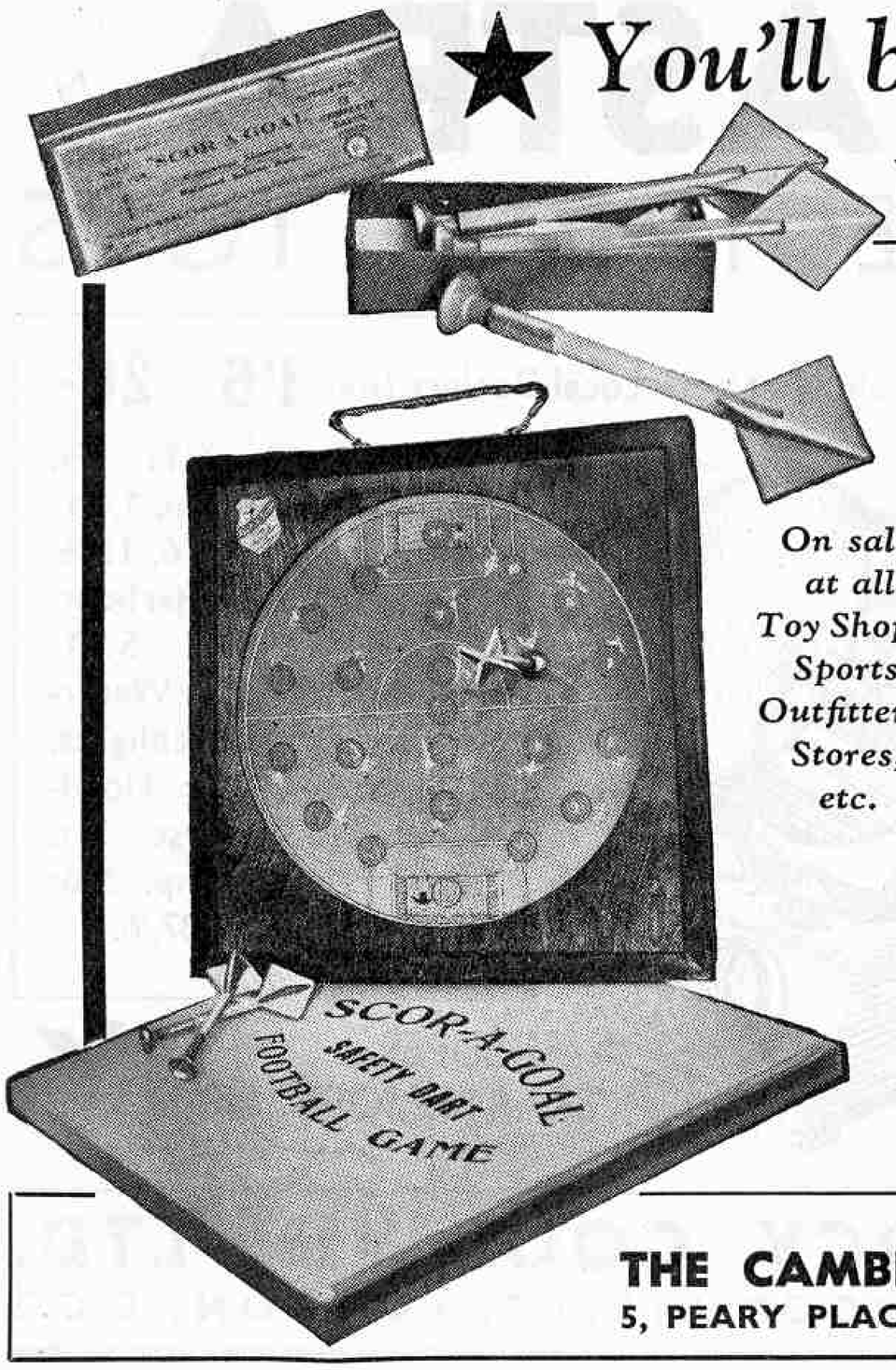
MAERKLIN STEAM ENGINES

4113/6. Polished Copper Centre Flue Boiler, fitted water gauge, drain tap, whistle, safety valve and steam regulator. Engine is single acting piston valve type, fitted lubricator and reverse. Height overall 9 in.
Price **15/–**, postage 6d.

4113/7. Larger Model, fitted double acting piston valve engine with reverse and 2-speed shaft. Height overall 12 in.
Price **25/–**, postage 9d.

Send for Bond's Catalogue, price 6d. It contains nearly 200 pages filled with bargains in Model Railway, Ship, Aeroplane Parts and Finished Models, also all Tools and Materials to make them. It also now contains many pages of instructions in Model Making which is sure to interest you. SEND FOR YOUR COPY NOW. Enclose 6d. for same.

BOND'S O' EUSTON ROAD LTD., 254, EUSTON ROAD, LONDON, N.W.1 Established 1887 'Phone: Museum 7137



★ You'll be glad of winter evenings— to play these fine new games

★ "SCOR-A-GOAL" SAFETY DARTS. The new improved Rubber Suction Darts. Guaranteed not to come apart. Price **1**/– per set of 3.
Also 5 TO 20 SAFETY DART BOARDS. Played on the double as in ordinary Dart Games.

★ "SCOR-A-GOAL" SAFETY DART FOOTBALL GAME. A great new game of Football. Played with complete safety. Price, complete with Darts, **5**/–.

★ THE "CORONATION" RETURN BALL BILLIARD TABLE. A new design, 3 ft. x 18 in. 2 Cues and 3 Balls. Complete, **15/6**. 2 ft. x 1 ft. **7/6** complete.

On sale at all Toy Shops, Sports Outfitters, Stores, etc.

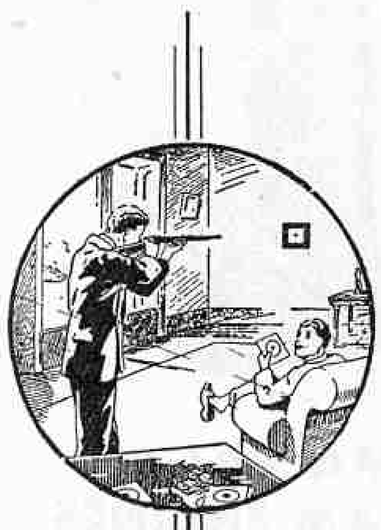
TRADE ENQUIRIES TO

THE CAMBRIDGE NOVELTY MFG. CO.

5, PEARY PLACE, BETHNAL GREEN, LONDON, E.2.

'Phone: Advance, 1049.

Here's exciting sport for winter evenings!



There are many exciting games that you can enjoy indoors with a B.S.A. Air Rifle during the long evenings, and if you have a B.S.A. Target Holder and Pellet Catcher there is no fear of damaged walls.

B.S.A. Air Rifles are remarkably accurate and you will find that you will be able to hit the "bull" on the target quite consistently in a very short time. The only ammunition required is B.S.A. lead pellets which cost only 2/3 per thousand (.177 size). B.S.A. Card Targets, which form a permanent record of Rifle practise, cost only 1/– per 100.

No licence is necessary to use a B.S.A. Air Rifle in the house, but the purchase must be made by someone over 17 years of age.

Be sure to fill in the coupon and post it now for more details.

Indoor shooting with a B.S.A. Air Rifle

Prices from **45'-** or only **4'3** monthly

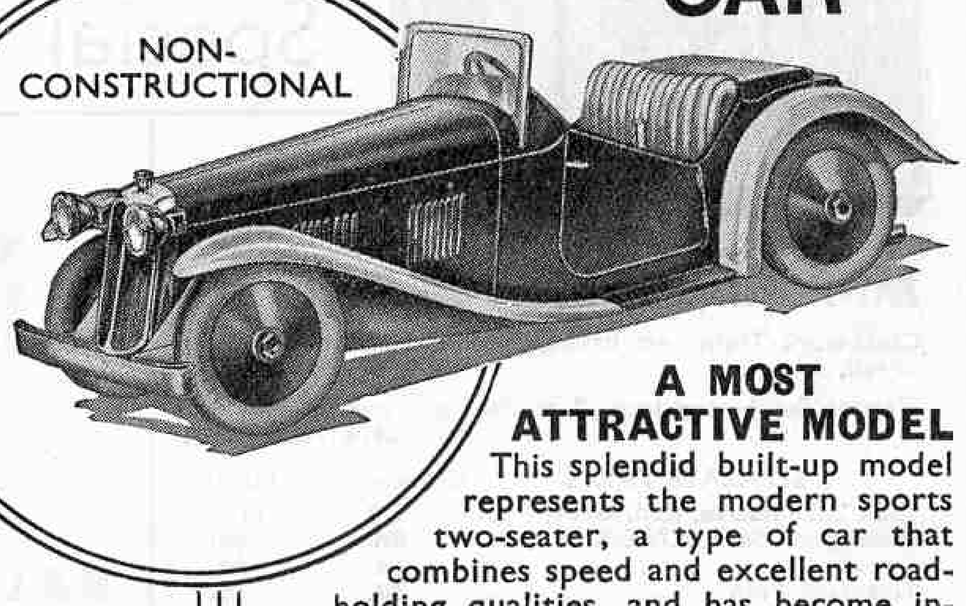
SEND COUPON TO-DAY

B.S.A. GUNS LTD., 92, Armoury Road, Birmingham 11.
Details of B.S.A. Air Rifles, please.

Name .....

Address .....

A REALISTIC TWO-SEATER SPORTS CAR



A MOST ATTRACTIVE MODEL

This splendid built-up model represents the modern sports two-seater, a type of car that combines speed and excellent road-holding qualities, and has become increasingly popular during recent years. Speed is suggested by the sweeping lines of the bodywork and mudguards, together with the sloping radiator and wind-screen.

The model faithfully resembles its prototype in all important respects. It is complete in itself, no constructional or assembly work being required. It steers from the wheel, and is fitted with a strong clockwork motor that gives a long and steady run.

Overall dimensions: Length, 8¼ in.; Width, 3⅜ in.; Depth 2⅞ in.

Price **6'6**

The model is beautifully made and finished, and is richly enamelled in Blue and Cream

Manufactured by

Meccano Ltd., Binns Rd., Liverpool 13

First for the Fifth"!

How about these for a start?

"Boy Scout Rousers" at 1d. and 2d. each—with loud bangs at the finish. "Indian Marvels" at 1d., 2d., 4d., 6d. and 1/–. "Crystal Cascades" at 1d., 2d., 4d. and 6d. —both these have splendid fountain effects. "Thunderstorms," 2d., 4d. and 6d. "Royal Salutes," 1d.—this one giving a jolly good bang! Here's a good pair: "Flying Fleas," 2d., and "Streamline Rockets," 2d. And if you want to do yourselves really well, go for "King Edward" Rockets, 1/–, 2/– and 3/–.

ON SALE AT ANY FIREWORK SHOP.

"Crystal Palace"

BROCK'S fireworks

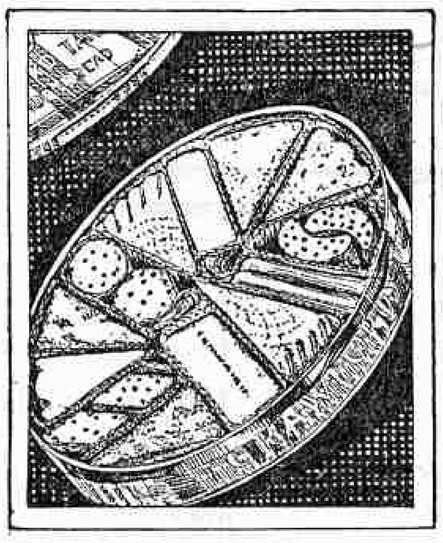
THE WORLD'S BEST

BUTTERFLIES, BIRDS' EGGS, PLANTS, etc.

Obtain your supplies of Books, Collecting Apparatus and Specimens from

WATKINS & DONCASTER, Dept. M.M.,
36, Strand, London, W.C.2 (P.O. Box 126).
'Phone: Temple Bar 9451. **Full Catalogue Post Free**

BE TALL Your Height increased in 14 days or money back! 3-5 inches rapidly gained. Amazing Complete Course sent for 5/– P.O., or details free. Write **Stebbing System, Dept. M., 28, Dean Road, London, N.W.2.**



CRAWFORD'S SHORTBREAD is made from the finest table butter

WILLIAM CRAWFORD & SONS LTD.,
EDINBURGH • LIVERPOOL & LONDON

HELY'S stock the complete range of Meccano, Hornby Trains, Dinky Toys and all Accessories
with the assistance of
MRS. DIXON, late of 14, Suffolk St.
COME AND SEE THE WONDERFUL DISPLAY IN
HELY'S SPORTS DEPT.,
Dame St., Dublin.

FOYLES

Booksellers to the World

New and second-hand books on every subject.
Catalogues free on mentioning interests.
119-125, CHARING CROSS RD., LONDON, W.C.2.
Telephone: Gerrard 5660 (12 lines).

D. A. PAVELY'S MODEL AIRSCREWS

Still pulling (1908)		The best! (1936)
Chauviere type (whitewood)	6" to 18"—1½d.	per inch
Symmetrical type (balsa) ...	6" to 18"—2d.	per inch

Postage U.K. any size propeller, 3d.

DEPT. "M," 187, REPLINGHAM RD., SOUTHFIELDS, LONDON, S.W.18

Standard Films for Sale or Hire, from 5/–.—Baers, 176, Wardour Street, W.1. Established 1907

RELIABLE—BRITISH MADE—VEST POCKET

WEATHER PROPHETS

IN STRONG BAKELITE CASE

USUALLY 10/6
EACH ONLY **2'6**
POST & BOX 3d.

Similar in operation to the expensive Aneroid

BAROMETER

These British made Weather Prophets are sturdily built and are thoroughly reliable. The instrument can be easily carried in the pocket. Simple to read. Write or call personally.

'Phone: Brighton 2238

Satisfaction guaranteed or money instantly returned.

NAUTICAL STORES (Dept. 9),
141, Kings Road Arches, Lower Parade, Brighton 1.

CN U RD THS

Well done! Now do better by reading this. To all applicants for my attractive approval sheets I am this month presenting **FREE** the **1936 TRIANGULAR LIBERIA AIR MAIL,** and, in addition, a **PACKET of 50 DIFFERENT STAMPS,** many mint. Further gifts for regular customers.

C. FAWCETT
36, FLAXLEY ROAD, SELBY

SPECIAL SNIPS:—
Canada Silver Jubilee, complete, used, at 1/10. India, K.G., 1, 2 and 5 rupees, large stamps, at 6d. Canada 1935 K.G., 1c. to 1 dollar, complete, at 2/9. Ascension, 1934, 6 beautiful mint pictorials, ½d. to 5d., at 1/9

SPECIAL OFFERS

10	Abyssinia different Pictorials, M.	1/–
10	Greece 1927 Pictorials, Ships, etc., U. ...	4½d.
9	Greece 1930, a very attractive set, U. ...	6½d.
6	Greece 1932 surcharged Pictorials, U. ...	6½d.
1	Holland 1936 Triangular Utrecht 6c., U. ...	3d.
4	India Silver Jubilee, U.	4½d.
5	Italy St. Francis of Assisi Comms., U. ...	4d.
4	Italy 1933, University Games, U.	7d.
25	Italy different Commemoratives. A good pckt.	9d.
25	Poland different, M. & U.	6d.
8	Roumania, King Carol or Michael sets, U. ...	6d.
3	Sweden, new issue, very attractive set, U. ...	2½d.

POSTAGE EXTRA.
Price list of hundreds of Sets and Packets Post Free on request.
DERRICK PARKEN, Greenwith, Perranwell, TRURO.

SOMETHING FOR NOTHING

is an offer that cannot be ignored. Write and ask for a selection of my up to date Approvals and particulars of my new **BONUS SCHEME** and I will give you, absolutely free of all cost, a magnificent complete set of unused **EXHIBITION** Stamps.

NO POSTAGE REQUIRED.

C. A. MASTERS, BROADSTONE, DORSET

GREAT BRITAIN

2/6 and 5/– K.G. sent free to genuine applicants for approvals enclosing 2d. postage. Get these now before the new ones come out.

R. D. HARRISON, Roydon, Ware

Mint BERMUDA New Issue Packet FREE

Magnificent opening season's offer: **Grand Packet of 28 British Colonials** inc. above handsome stamp, a **Rare Silver Jubilee, Cyprus** (1934 Salamis) and soon to be obsolete K.G. issues. Write now for this grand free gift. Send 2d. post (6d. abroad) and ask for my **Modern** approvals.

CAMPBELL, 71, Manor Rd., Tankerton, Kent.

DON'T READ THIS

unless interested in stamps.

Have you a complete short set of Queen Astrid Mourning Stamps?—No—Then write for this very fine set at once.

Contains the 10c.+5c. Black, 25c.+15c. Chocolate, 35c.+5c. Green, and the 50c.+10c. Mauve. Four Perfect Used Stamps. Free to all applicants requesting approvals enclosing 2d. stamp for postage.

K. HUMPHRIES (Dept. M.),
East Wittering Road, East Wittering, Chichester, Sussex.

BECK'S CHEMISTRY

SETS
PRICES FROM:
2/6 to 105/-
(post free)
EQUIP YOUR OWN LABORATORY WITH APPARATUS AND CHEMICALS.

WRITE FOR LATEST CATALOGUE **FREE!**

BECK (Scientific Dept. G.), 60, High St., Stoke Newington, London, N.16.

READERS' SALES

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

65/– Meccano parts, accept £1; 66 "Hobbies," 5/–; 132 Designs, £1; 33 "Schoolboys' Own," 5/–; 86 "Magnets," 5/–. Or offers.—Smart, Grantham Hotel, Eastleigh, Hants.

Sale. Adana Printing Machine, Accessories, complete, as new, used once, cost 45/–. What offers?—C. R. Drury, Brylai, Coombe Hill Road, Kingstone, Surrey.

Wireless Bargains. Crystal Set, 5/–. 2-Valve Kit, 9/6. Valves, 1/9. All perfect. Stamp list.—60, Avenue Approach, Bury St. Edmunds.

Forty-five "M.M.'s," November 1930–July 1934. Perfect condition. What offers?—J. P. C., 97, Dacre Park, London, S.E.13.

Practically new locos, rolling stock, unused permanent way in brass. New Bassett-Lowke station, accessories. Mansell wheels throughout. List.—Haggas, Oakworth, Keighley.

Standard Lantern Slides. Cheap lots monthly. Stamp.—"Entertainments," 1-106, Brighton Road, Birmingham, 12.

Sale. Pathe 9.5 Films: 20 feet, 1/–; 30 feet, 1/6; 300 feet, 14/–.—Broome, 31, Serpentine Road, Wallasey.

9.5 H.C.C. Projector, A.C. Mains, double-claw and three 30 ft. Films, 21/–; 2 super Films, Comedy and Western, 12/6.—Huke, Leatherhead School, Surrey.

Cigarette Card Collectors. For sale, many sets, part sets, 1910–1915 at catalogue prices. List on request.—Gregor, Swn-y-mor, Tavistock Road, Swansea.

For Sale. "Constructments" '100' Outfit. Cost 37/6, little used, £1 or nearest offer.—Lewsley, Ash Tree House, Borrowash, Derby.

£12 secures marvellous collection 1,200 Postage Stamps. Complete Album (approval); catalogued at £40; 1,000 odd Cigarette Cards, recent, spotless, 7/6; 500 ditto in sets (Players), 7/6; 50 "Motor-Cycles," 5/–. Post free.—Rose, "Meadowways," Copsemead, Woodley, Reading.

2-Valve Radio, Speaker, Valves, H.T. and G.B., Walnut Cabinet, 22/6; also 3-Valve, as above, 32/6; Components, 2 Cabinets, 15/–; Chemical Cabinet, oak, complete with Burette, etc., 35/–; Balance (.001 to 250 grams), levelling, triple arrest, 21/6; Box Weights, .001 to 50 grams, 7/6; Microscope in polished case, 7/6; Lenses, Galvanometer, etc. Stamp List.—"A," Northcliffe, Standon, Herts.

Sale. Neatly assembled and painted Skybird Aeroplanes, Accessories. Write for list.—3, Altar Drive, Heaton, Bradford, Yorks.

Wanted. Model Alfaromeo Cars, any condition.—D., 60, Hillway, Highgate, London.

CINEMATOGRAPHS British Made from 37/6
CINEMATOGRAPH FILMS
Standard Size only. Write for Catalogue, post free. Sample Film and Catalogue 1/– and 2/6.
Filmeries Co., 57, Lancaster Rd., Leytonstone, E.11

FINE BARGAINS in used models and toys; catalogue 4½d. Models purchased.—Model Exchange, 11, Friars Street, Ipswich.

Home Cinematographs, Mains or Battery. Standard Films cheap. Lists.—"Pictures," 109, Kenlor, Tooting, London.

Almost New. Pathé Imp Projector, motor drive, Coronet Cine Camera, 9.5 mm. and extras, cost £12. A bargain, £8.—C. A. Maxwell, Optician, 95, High St., Scunthorpe.

Books for the Practical Boy

Railway Modelling in Miniature. By EDWARD BEAL. Deals with planning, building and operating, with special reference to "OO" and "HO" gauges. 133 pages. 20 plates and 270 line illustrations. Price 3/6; post free 3/10.

The New Model Aeroplane Manual. A complete guide to Building and Flying. By L. H. SPAREY and C. A. RIPPON. 284 pages; 223 illustrations. Price 3/–; post free 3/4.

Soldering, Brazing and the Joining of Metals. A practical handbook on these important workshop processes. Illustrated. Price 9d.; post free 10d.

Working Model Railways: How to Build and Run Them. A descriptive guide to the fascinating model railway hobby, with practical hints on starting and running a complete model railway system. 9d.; post free 10d.

Model Railway News. Full of interest to all Model Railway enthusiasts. Specimen copy 6d., post free. 1st of month.

Write for complete list of popular hobby books, post free.

PERCIVAL MARSHALL & CO. LTD.
15M, FISHER STREET, LONDON, W.C.1

This Month's Special Articles

	Page
Air News	630
Books to Read	642
Competition Page	671
Engineering News	624
Fireside Fun	674
Flying Nearly 9½ Miles High	623
"Frank Hornby, Inventor of Meccano"	614
From Our Readers	640
Four Bridges in One	616
Furnaces that are Rocked at Work	622
Guild Pages	658–9
Homeward Bound	632
Hornby Railway Company Pages	660–665
How Cotton Driving Ropes are Made	626
In Search of New Models	650
Meccano Working Spinning Mule	652
Midland and Great Northern Railway	635
Model-Building Competition	656
Model-Building Competition Results	657
New Outfit Models	654
Newfoundland Banksmen	672
Oil From Shale	638
Old Locomotives and Where to See Them	628
Of General Interest	646
Photographing Models with a Box Camera	648
Railway News	636
Railway Working in Holland	620
Royal Air Force	618
Snow Scenes at Hollywood	634
Stamp Pages	667, 669
With the Model-Builders	653

Collect Shipping Photographs

Send 3d. for specimen postcard and Illustrated List of over 700 different real photographs of Liners, Freighters, Cunard-White Star, Harrison, Blue Funnel, Blue Star, Bibby, Ellerman Lines, etc., 2d. each, 2/– per dozen, postage free. Photographs of the new liners: "Awatea" and "Queen Mary," now available.
B. & A. FEILDEN (M.13),
12, Harlech Road, Blundellsands. Liverpool 23, Eng.
(Trade Enquiries Invited.)

CIGARETTE CARDS
Send for
1937 FREE AND POST FREE CATALOGUE LISTING OVER 700 INTERESTING AND POPULAR SERIES
At lowest prices.
FULL CATALOGUE OF 2,300 SERIES 8d. post free.
"THE CIGARETTE CARD NEWS"
All Collectors should read
THE HOBBY'S MONTHLY JOURNAL
Specimen copy 2½d., 6 months' subscription 1/3, post free.
THE LONDON CIGARETTE CARD CO. LTD., Room E, Cambridge House, Cambridge Road, Chiswick, LONDON, W.4.

RAILWAY PHOTOGRAPHS
OUR NEW 16th List of 700 Pre-grouping, Historical and Foreign Railway Titles is just published. (Post-cards 2/6 per dozen post free U.K. Single copies 3d. each.)
Send 2/– for following Express Trains and Locomotives of the World, Set M2.

"The Royal Blue"	Turkish State 4-8-0
"International Limited"	Columbian State 2-8-8-2
"City of Portland"	Victorian Railway 4-6-0
Tokyo-Yokohama Express	Tientsin-Pukow 4-6-2
Eastern Bengal 4-6-2	Servian State 0-10-0
Russian State 4-8-2-2-8-4	New Zealand Gov. 4-6-2

AEROPLANE AND SHIP PHOTOGRAPHS.
Over 500 Aeroplanes and 300 Ship Photographs, 2/– per dozen. Send 4d. for List required (stating section), specimen card and booklet.
REAL PHOTOGRAPHS CO. (Dept. M), COOPER'S BLDG., CHURCH STREET, LIVERPOOL 1.

Microscopes and Telescopes
Cost shillings, worth pounds. No. 1, 100X, 5″, 4/6; No. 2, 200X, 8″, 8/6. No. 3, Triple Power Rotating Objectives (rack focussing), 30/–. (Post 6d. extra.) Telescopes, two power, 20 and 30X by "Dollond." For Terrestrial and Astronomical use. (Worth £5/5/–.) Closed 10″, open 31″, 57/6.
Send 1d. stamp for real photos illustrating.
C. A. MAXWELL, F.S.M.C., Optician, 95, High Street, Scunthorpe. (Est. 1913.)

Just Imported. Latest American Science, Mechanics, Inventions Magazines. 6 different 3/3. Lists Free. Books, Magazines bought, exchanged.—M. M. Final, 15, Nashleigh Hill, Chesham, Bucks.

CASTING MOULDS
Make your own lead soldiers, animals, Indians, etc. Sample Mould, 2/9. Catalogue, stamp.
Industries, 13, Gordon Av., Twickenham.

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/– for six issues and 8/– for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

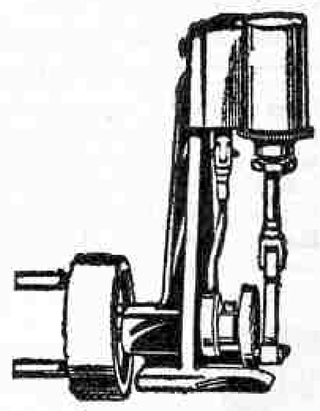
Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

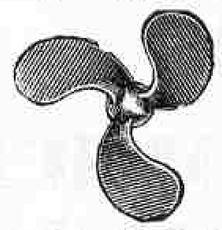
Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Marine Steam Engines



Double Acting Piston Valve
½″ bore, ⅝ stroke, **7/6**
Oscillating, 7/16″ x 1″ **4/6**
Ditto, miniature, ⅜″ x ⅝″ ... **3/–**
Boilers, complete Steam Plants, Steam Fittings.

Propeller Shafts, complete with Stern, Tube, and Packing Gland.
Flexible type, 9¾″ long **1/–**, post 2d.
Rigid type, 7″ long ... **11d.**, post 2d.



Propellers
1½″ **8d.**, 2″ **9d.**, 2½″ **1/–** post 2d.
Write for Catalogue, 1½d. Orders promptly despatched.

F. YATES & SON LTD.,
144, Church Street,
Kensington, London, W.8.

WEBLEY AIR PISTOLS
Marvellously accurate for target practice.

No license required to purchase.
Senior 45/-, Mark 1 30/-, Junior 20/-, Webley Air Rifle 80/-
Write for List. WEBLEY & SCOTT LTD., 87, WRAMAN STREET, BIRMINGHAM, ENG.

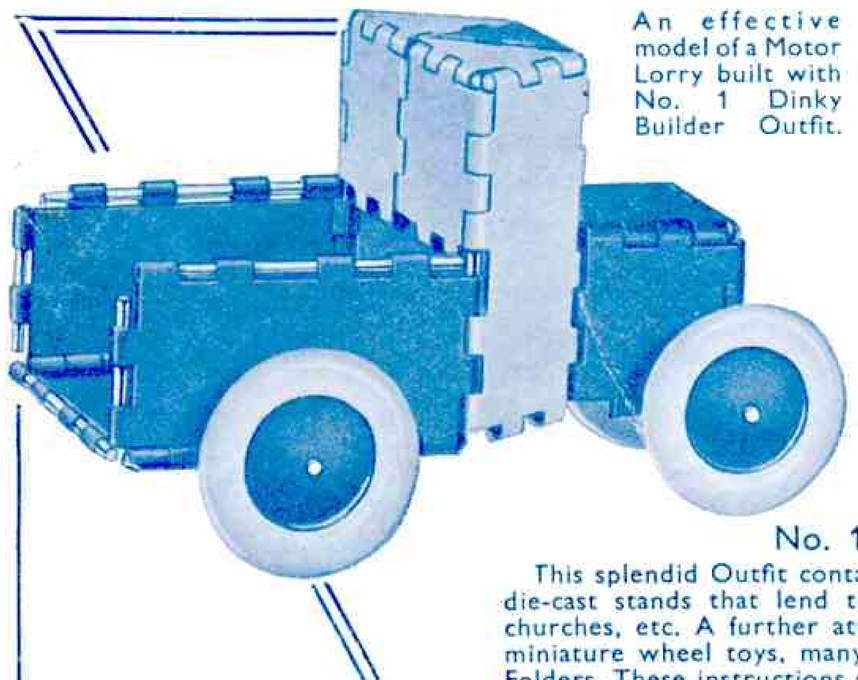
Dinky Builder

A fascinating building hobby

Simplicity is the keynote of this new building system, by means of which the youngest children can build all kinds of models with the greatest of ease—Towers, Bridges, Coaches, Houses, Wheel Toys, Windmills and scores of others.

The parts are beautifully enamelled in striking colours, giving a charm and distinction to the models that is outstandingly attractive.

Dinky Builder Plates are hinged on all sides, with intervening spaces so that when two are placed side by side the hinged part of one Plate fits into the corresponding space in the other. The two plates are then locked by inserting a rod. Nuts and bolts are not required.



An effective model of a Motor Lorry built with No. 1 Dinky Builder Outfit.

No. O DINKY BUILDER OUTFIT

This Outfit contains a good assortment of Dinky Builder parts (including two road wheels), with which a splendid range of models can be built. The Instruction Folder included gives examples of 40 models, but many others of an original character may be constructed by the inventive boy or girl.

Price 2/6

No. O Dinky Builder Outfit

Price 2/6

No. 1 DINKY BUILDER OUTFIT

This splendid Outfit contains a varied selection of parts, including two trees on die-cast stands that lend the correct atmosphere to models of farm buildings, churches, etc. A further attraction is a set of four road wheels for constructing miniature wheel toys, many examples of which are illustrated in the Instruction Folders. These instructions show a total of 92 fine models, including 8 that feature the new parts with windows.

Price 4/11

No. 2 DINKY BUILDER OUTFIT

The No. 2 Dinky Builder Outfit contains a comprehensive selection of parts with which all the No. O and No. 1 Outfits models can be built. In addition, the parts in this fine Outfit make possible the construction of seven groups of miniature model furniture and 20 other wonderful models featuring the new parts with windows. Full instructions for building the complete range of models are given. **Price 7/9**

No. 3 DINKY BUILDER OUTFIT

This is the largest Outfit in the series, and its model-building possibilities are almost limitless. No other could give them the same pleasure and the same intense satisfaction.

The parts contained in this Outfit can be used over and over again to make hundreds of different models, including Towers, Bridges, Buildings of all types, Wagons, Aeroplanes, Delivery Vans, Motor Cars, Furniture, etc. Full instructions are provided. **Price 10/9**

The addition of various Dinky Toys greatly increase the realism and attractiveness of Dinky Builder Models.

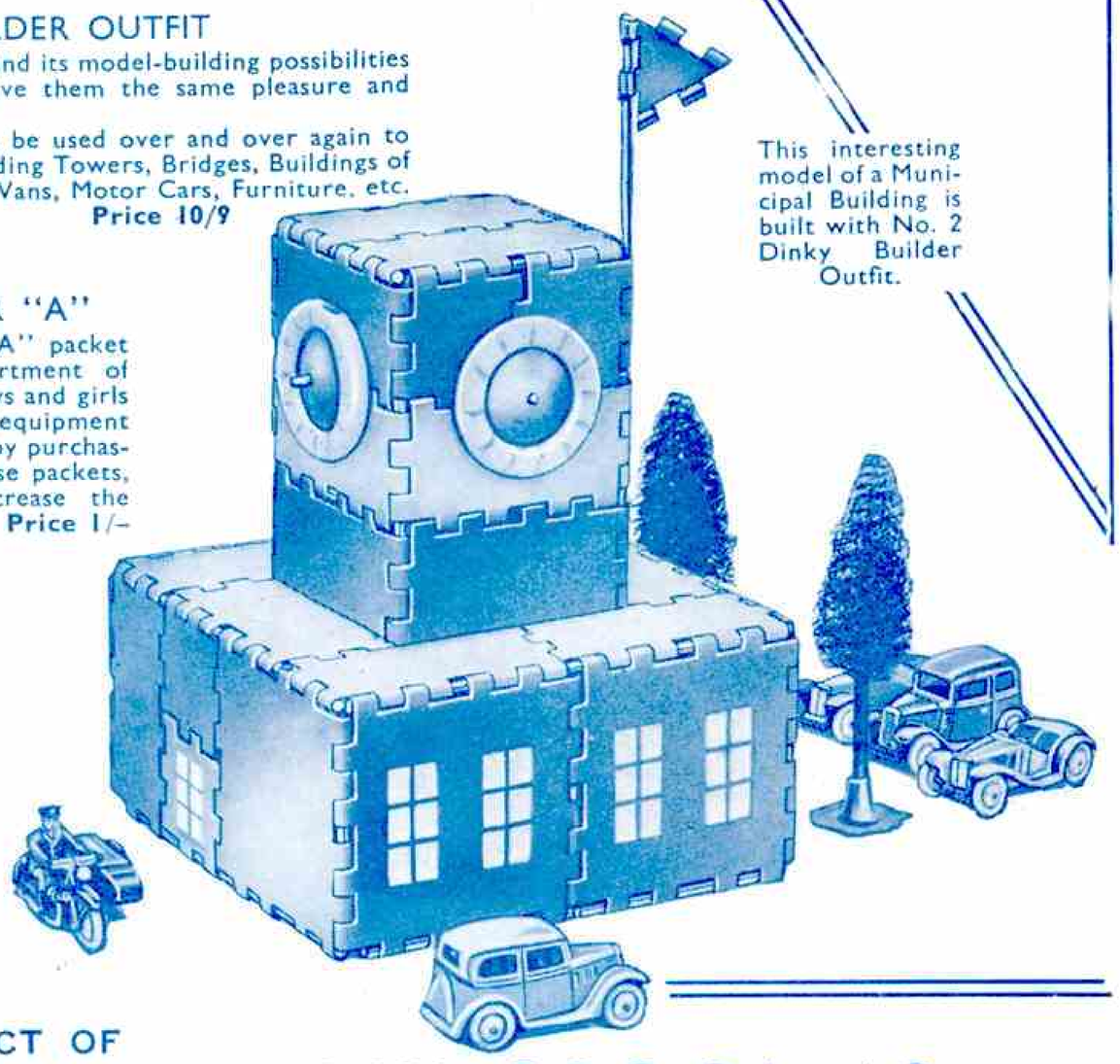
Ask your dealer for a copy of the latest price list of Dinky Toys in which the complete range of these fascinating miniatures is fully illustrated.

No. 3 Dinky Builder Outfit

Price 10/9

DINKY BUILDER "A"

The Dinky Builder "A" packet contains a useful assortment of Dinky Builder Parts. Boys and girls should supplement the equipment they at present possess by purchasing one or more of these packets, which will greatly increase the scope of their Outfits. **Price 1/-**



This interesting model of a Municipal Building is built with No. 2 Dinky Builder Outfit.

PRODUCT OF

MECCANO LIMITED — LIVERPOOL 13

HORNBY ELECTRIC & CLOCKWORK TRAINS

The Most Fascinating Pastime in the World!

RUN YOUR OWN MODEL RAILWAY!

You have spent many happy hours watching real trains at work. Now start a railway of your own and enjoy the thrill of operating Engines, Coaches, Wagons, Signals and Points on actual railway principles. It's the most fascinating pastime in the world!

The performance and durability of the Hornby Electric Trains place them in a class entirely their own. Each locomotive is fitted with a powerful motor that will pull heavy loads at high speeds, always under perfect control.

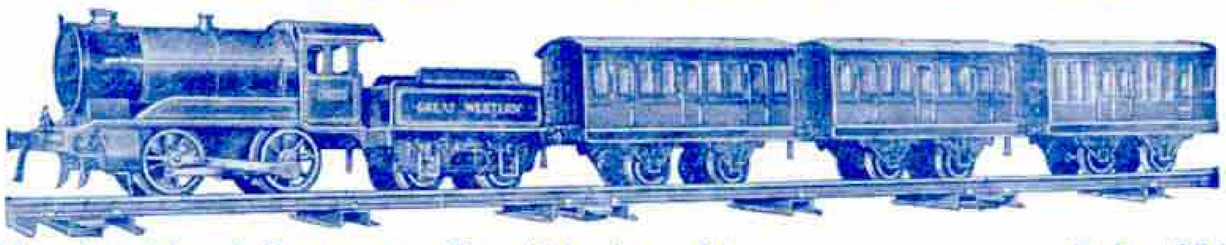
Hornby Clockwork Trains are hauled by the longest-running spring-driven locomotives in existence. The motors fitted are of the highest quality, being perfect mechanisms with accurately-cut gears that ensure smooth running.

Hornby Train Sets are available at prices ranging from **15**/– to **75**/– for Electric models and **4**/**11** to **65**/– for Clockwork models.

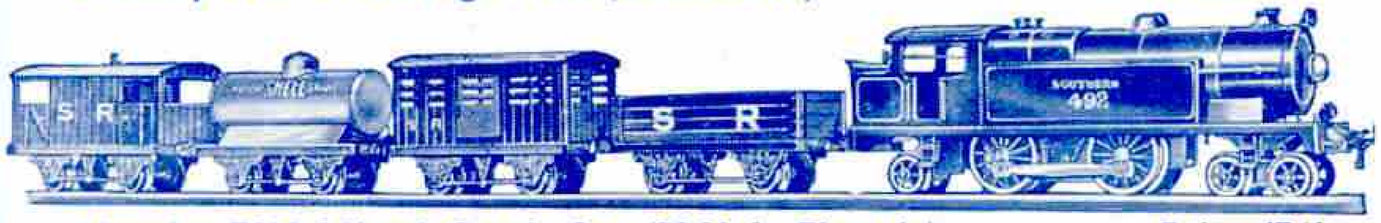
ASK YOUR DEALER FOR A COPY OF THE LATEST CATALOGUE.

A SELECTION FROM THE RANGE OF HORNBY TRAINS

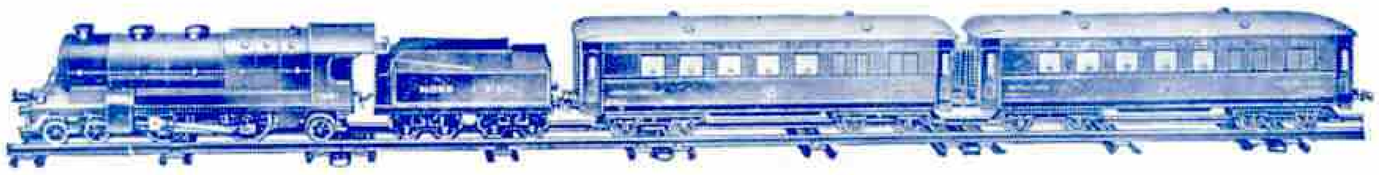
EM320 Tank Goods Set (20-Volt Electric) ... ... Price 24/–



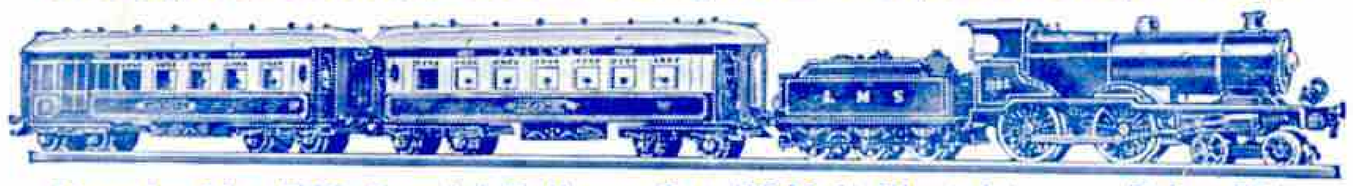
Hornby No. 1 Passenger Set (Clockwork) ... ... Price 25/–



Hornby E220 Mixed Goods Set (20-Volt Electric) ... ... Price 47/6



Hornby No. 3C Riviera "Blue" Passenger Train Set (Clockwork) Price 57/6



Hornby No. E220 Special Pullman Set (20-Volt Electric) ... Price 75/–

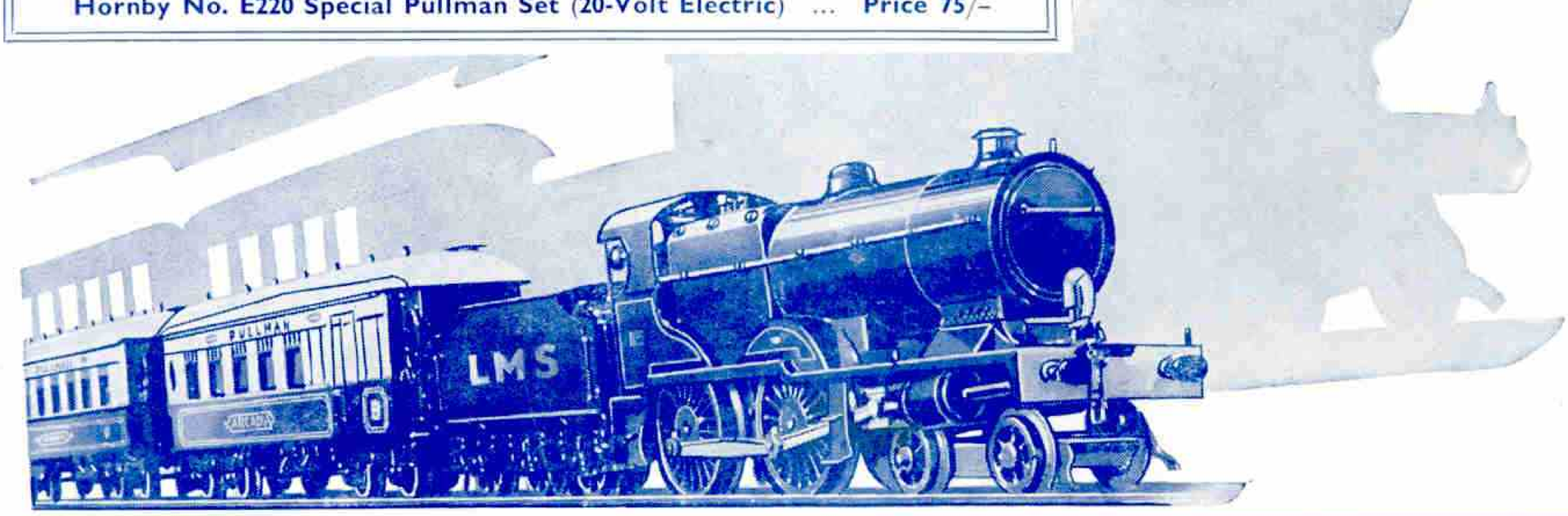
A selection from the range of HORNBY LOCOMOTIVES

ELECTRIC MODELS

EM120 (20-volt) or EM16 (6-volt) Locomotive (non-reversing) Price **8**/**6**
EO20 (20-volt) Locomotive (reversing) Price **22**/–
E120 (20-volt) Tank Locomotive (reversing) Price **24**/–
E120 (20-volt) Special Tank Locomotive (automatic reversing) Price **30**/–
E220 (20-volt) Special Tank Locomotive (automatic reversing) Price **32**/**6**
E220 (20-volt) Special Locomotive (automatic reversing) Price **37**/**6**

CLOCKWORK MODELS

M1/2 Locomotive (reversing) Price **4**/**6**
M3 Tank Locomotive (reversing) Price **7**/**6**
No. O Locomotive (reversing) Price **10**/**6**
No. 1 Special Locomotive (reversing) Price **17**/**6**
No. 2 Special Locomotive (reversing) Price **27**/**6**



The illustration below shows Hornby No. 2 Special Pullman Train Set with its true-to-type model of the L.M.S.R. "Standard Compound" class Locomotive bearing the number "1185."

PRODUCT OF
MECCANO LTD. -- BINNS ROAD -- LIVERPOOL 13

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London.